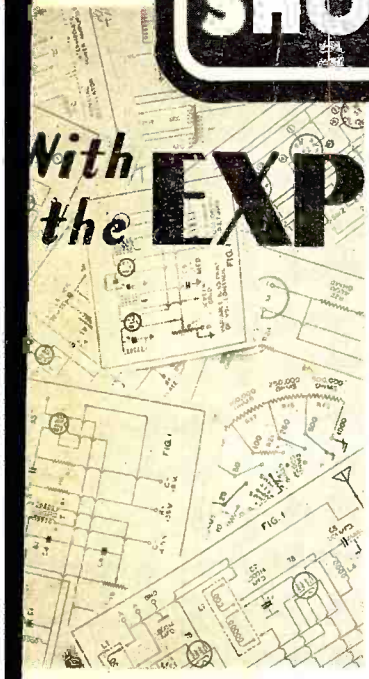
MID-SEASON DX RECEPTION

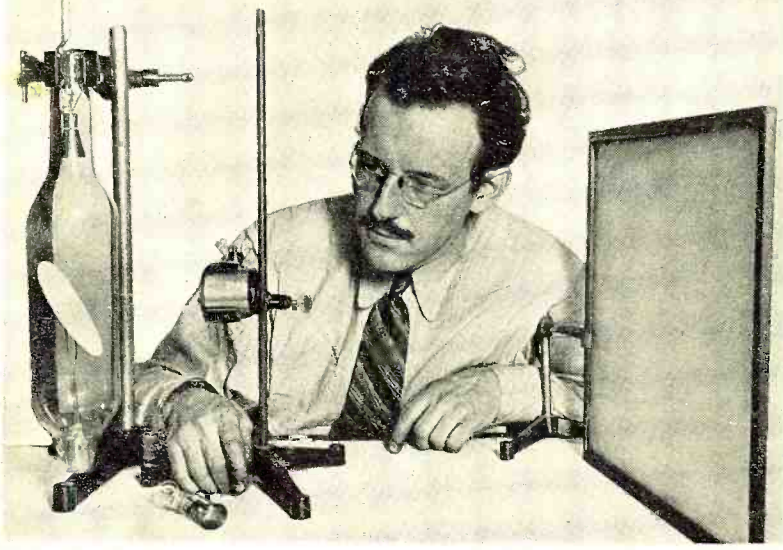
RADIO NEWS AND SHORT WAVE RADIO

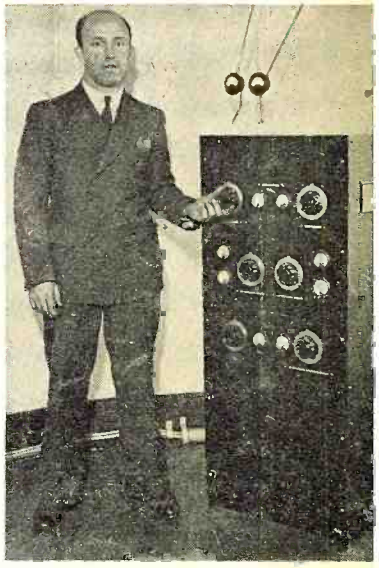
NRA U.S. CODE

FEBRUARY, 25¢

With the EXPERIMENTERS







LATEST EXPERIMENTS *in* TELEVISION • SHORT WAVES • ELECTRONICS • AMATEUR *and* LABORATORY ACTIVITIES

EACH MONTH!
A Triple-Checked S. W. Time-Table

Three sources triple-check the RADIO NEWS SHORT-WAVE TIME-TABLE:

1. Monthly logs of 130 Official R. N. Listening Posts in 20 strategic countries for world-wide S.W. reception.

2. Daily logs by experts in our Central Listening Post.

3. Monthly Official Schedules from the World's Leading S.W. Stations.

S. W. CONVERTER PLAN

A Publication Devoted to Progress in Radio

Television Experiments Engineering Measurements
Short Waves DX Reception Broadcasting Amateur Activity
Service Work Electronics Set Building Operating Data

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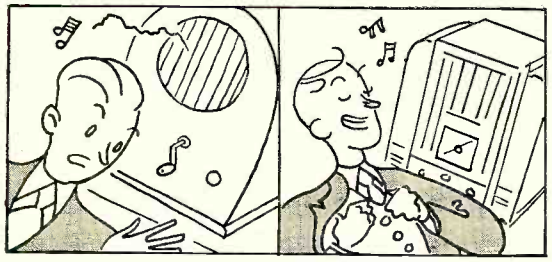
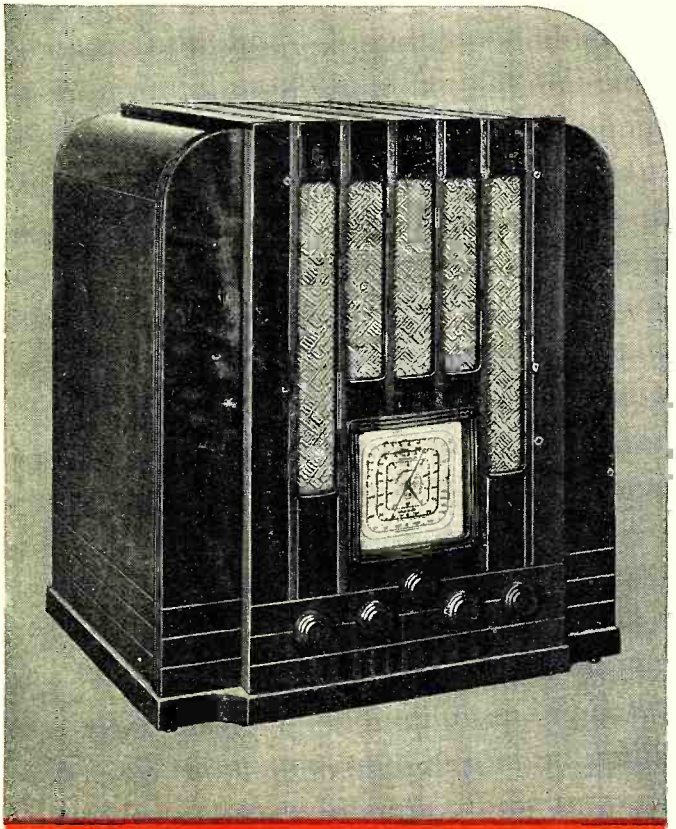


WHEN THE BANDS ARE "HOT"

ON A "DEAD" BAND

When signals are weak...

THAT'S THE TIME TO JUDGE A RADIO



G-E ALL-WAVE RADIO
MODEL M-81 $97.50
Other models from $44.95 to $375.00
(Prices slightly higher West, Midwest, and South)
Subject to change without notice.

Don't attempt to judge the ability of an all-wave radio when reception is at its best—when the bands are "hot." Almost any receiver will perform well then. It takes a test under adverse conditions — when short-wave signals are weak—on one of those "dead" bands—to show what a radio really can do. That's when a General Electric All-wave Receiver plainly demonstrates its true superiority.

In standard broadcast reception, the useful sensitivity of a set is ordinarily limited only by extraneous noise or interference picked up by the antenna. In short-wave reception, however, especially below 40 meters, set noise or "tube hiss" becomes the factor which limits the ability of a receiver to give good reception on weak signals.

General Electric All-wave Receivers, because they are designed and constructed with that condition in mind, have extraordinary ability to perform well on weak short-wave signals. The noise level of the set is kept at a minimum by careful apportioning of amplification to the radio, intermediate, and audio frequency stages of the instrument.

The set illustrated can be adapted for C.W. reception. Ask us about it. For full information on this adaptation or the G-E All-wave Double Doublet Antenna System, write to the address below.

GENERAL ELECTRIC

ALL-WAVE RADIO

MERCHANDISE DEPARTMENT, GENERAL ELECTRIC COMPANY, BRIDGEPORT, CONNECTICUT

www.americanradiohistory.com

J. E. Smith, President National Radio Institute

I WILL HELP YOU START A SPARE TIME OR FULL TIME RADIO SERVICE BUSINESS WITHOUT CAPITAL

HERE ARE A FEW EXAMPLES OF THE KIND OF MONEY I TRAIN MY MEN TO MAKE

Clears $4500 in 18 Months

"Before taking your Radio Course I was making $18 a week. I came here three years ago. In about 18 months I made about $4500 in Radio. I cannot say too much for the wonderful help I have received from N. R. I."

Noel W. Ray,
619 Broad St.,
Gadsden, Alabama.

Spare Time Work Pays $18 a Week

"I only do spare time Radio work and average $18 a week. People who in good times would buy a new Radio, now have the old one fixed."

Stephen J. Drapchaty,
407 Wunderlich Avenue,
Barberton, Ohio.

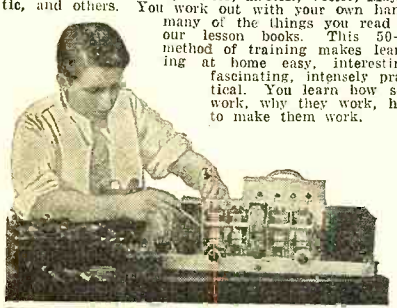
Now Owns Own Business

"If I had not taken your Course I would be digging ditches instead of running my own business. One week I made $75 on repairing alone, and this doesn't count sales. If a fellow wants to get into Radio, N. R. I. is the starting point."

R. S. Lewis,
Modern Radio Service,
Pittsfield, Ill.

You Get PRACTICAL EXPERIENCE with Radio Equipment I Give You

My Course is not all theory. I'll show you how to use my special Radio equipment for conducting experiments and building circuits which illustrate important principles used in such well-known sets as Westinghouse, General Electric, Philco, R.C.A., Victor, Majestic, and others. You work out with your own hands many of the things you read in our lesson books. This 50-50 method of training makes learning at home easy, interesting, fascinating, intensely practical. You learn how sets work, why they work, how to make them work.



Free Book Tells How Mail Coupon!

The world-wide use of Radio sets for home entertainment has made many opportunities for you to have a spare time or full time Radio business of your own. I give you instructions early in your Training for doing 28 Radio jobs common in almost every neighborhood. Many N. R. I. men make $5, $10, $15 a week extra in spare time while learning. I show you how to install and service all types of receiving sets. I give you Radio equipment and instructions for conducting experiments, for building circuits and testing equipment, and for making tests that will give you broad, practical Radio experience. Clip the coupon below and get my free 64-page book, "Rich Rewards in Radio"—it gives you a full story of the success of N. R. I. students and graduates, and tells how to start a spare time or full time Radio business on money made in spare time while learning.

Many N. R. I. Men Make $5, $10, $15 a Week Extra in Spare Time While Learning

Many of the seventeen million sets now in use are less than 50% efficient. I will show you how to cash in on this condition. I will show you the plans and ideas that have enabled many others to make $5, $10, $15 a week in spare time while learning. Ford R. Leary, 1633 Davison Road, Flint, Mich., wrote: "My part-time earnings while taking the N. R. I. Course were $651."

Get Ready Now for a Radio Business of Your Own and for Jobs Like These

Broadcasting stations use engineers, operators, station managers, and pay up to $5,000 a year. Radio manufacturers use testers, inspectors, foremen, engineers, servicemen and buyers, and pay up to $6,000 a year. Radio dealers and jobbers employ hundreds of servicemen, salesmen, managers, and pay up to $5,000 a year. Radio operators on ships enjoy life, see the world, with board and lodging free, and get good pay besides. My book tells you of the opportunities in these fields, also in Aviation Radio, Television, Police Radio, Short Wave Radio, Automobile Radio and other new branches of this fast growing industry. Get it.

I Train You at Home in Your Spare Time

Hold your job until you're ready for another. Give me only part of your spare time. You do not need a high school or college education. Hundreds with only a common school education have won bigger pay through N. R. I. J. A. Vaughn jumped from $35 to $100 a week. J. E. McLaurine increased his earnings 100 per cent. The National Radio Institute is the Pioneer and World's Largest organization devoted exclusively to training men and young men by Home Study for good jobs in the Radio industry.

You Must Be Satisfied

I will give you an agreement to refund every penny of your money if you are not satisfied with my Lesson and Instruction Service when you complete my Training. And I'll not only give you thorough training in Radio principles, practical experience in building and servicing sets, but also Advanced Specialized Training in the type of Radio work you choose.

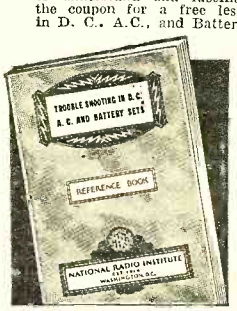
Get My Free Book of Facts

Mail the coupon for "Rich Rewards in Radio." It's free to any ambitious fellow over 15 years old. It tells you about Radio's spare time and full time opportunities; about my training; what others who have taken it are doing and making. Mail coupon now in an envelope, or paste it on a 1c post card.

J. E. SMITH, Pres.
Dept. 5BR
National Radio Institute,
Washington, D. C.

FREE: Radio Servicing Tips

Let me PROVE that my Course is clear, easy to understand and fascinating to study. Send the coupon for a free lesson, "Trouble Shooting in D. C., A.C., and Battery Sets." This interesting lesson gives 132 ways to correct common Radio troubles. I am willing to send this book to prove that you too can master Radio—just as thousands of other fellows have done. Many of them, without even a grammar school education, and no Radio or technical experience, have become Radio experts and now earn two or three times their former pay. Mail the coupon now.



This Coupon is Good For One FREE COPY OF MY NEW BOOK

J. E. SMITH, *President*,
National Radio Institute,
Dept. 5BR,
Washington, D. C.

NRA MEMBER U.S. WE DO OUR PART

Dear Mr. Smith: Without obligation, send me the Service Manual and your free book about spare time and full time Radio opportunities, and how I can train for them at home in spare time. (Please print plainly.)

Name .....*Age*.....

Address .....

City .....*State*.... "M"

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Vol. XVI
No. 8

RADIO NEWS

February, 1935

Edited by LAURENCE M. COCKADAY

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Broadcast Editor

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Associate Editor

JOSEPH F. ODENBACH
Art Editor

THIS MONTH—

Experiments

Developments

DX Reception

Servicing

P. A. Work

NEXT MONTH—

The March issue will contain a number of new set designs, some simple and some more advanced, to supply the set builder with new models employing the latest developments.

For the amateur: We are conducting experiments in ultra-short-wave transmission and reception, and hope to have complete details ready for construction and operation.

For the experimenter: Articles on the many Uses for Regeneration and Design Work on Reactors.

For the DX fan: The Short-Wave and Broadcast-Band DX Corners will contain up-to-the-minute news about New Stations, Time Schedules, Frequencies, etc.

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SCIENCE - - -

knows more than the crowd

GLENN•

Major Glenn, foremost British scientist, engaged in transmission phenomena research of the most precise nature at Cambridge University, England, tested 47 of the world's finest all-wave receivers. My MASTERPIECE alone withstood all his tests and was adjudged by him to be the finest, most capable all-wave receiver ever produced.

BOSTWICK•

William C. Bostwick, consulting engineer at Ithaca, N. Y., associated with one of America's greatest universities, says, after having made exhaustive scientific and measurement tests on all-wave receivers, "MASTERPIECE III is head and shoulders above everything else."

PARAMOUNT•

Paramount sound technicians, which staff includes some of the foremost authorities on high frequency work and sound reproduction, selected MASTERPIECE III from the entire field for the Richard Arlen-Bing Crosby international DX contest with results that are today a world's record for DX reception.

COLUMBIA•

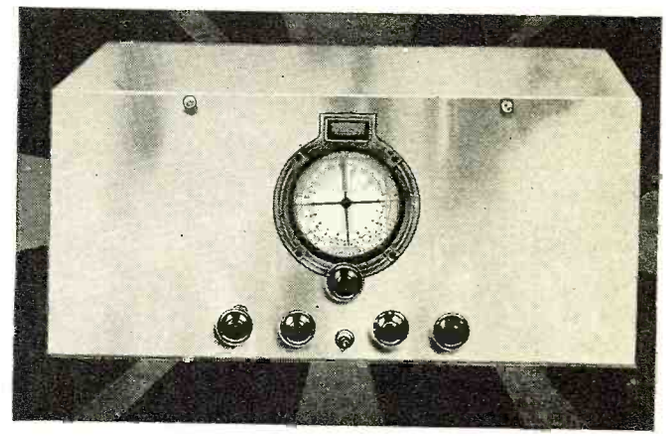
Columbia Broadcasting system, after having exhaustively tested practically every make of all-wave receiver, adopted MASTERPIECE III for official use in their Chicago studios.

BYRD•

Admiral Byrd, in collaboration with one of America's foremost colleges of engineering, tested many all-wave radio receivers and selected five MASTERPIECE Receivers for his antarctic expedition.

You don't want the same kind of ordinary all-wave receiver that everybody else has . . . you want the one that *Science* proves best. Read what some of the world's foremost scientific men say about

MASTERPIECE III



Get Everything You Expect or There's No Deal

I was the first to offer a ten-day trial with money-back guarantee. I make that offer because I know that my MASTERPIECE III, under your own reception conditions, will out-perform anything else that you can place alongside it. That offer is still open and it means simply that you get everything you expect or there's no deal. Put MASTERPIECE III to every test of which you may think; ask it to do what one might ordinarily call "impossible", and you'll be amazed at the results. If you are not satisfied, you can have your money back. It's just as simple as that.

Send for My New Book

My new big book gives all the technical reasons for the superiority of MASTERPIECE III. A copy is waiting for you. The coupon on this page will bring it. Clip and mail it today.

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RUSSIAN RADIO FANS

That the people of the Soviet Union are interested in radio is evident from these two views showing H. G. Wells broadcasting greetings and a group of workers experimenting and listening in on a 2-tube set built entirely by themselves in their leisure hours

A NEW EXPERIMENT

The Mayors of Ramsgate and Margate and the Senior Councilor of Broadstairs, England, officially and jointly open a new building erected for the group reception and redistribution of broadcasting. It will transmit programs to subscribers, equipped with loudspeakers only, by wire and will serve 150,000 families

More New Tubes

NEW YORK, NEW YORK—Two new tubes have recently been announced. They are to be known as type 6A6 and 83V. 6A6 tube is a complete Class B output tube similar to type 53 but with a heater rating of .8 ampere at 6.3 volts. Otherwise the characteristics are the same as for type 53. The power output of 10 watts is obtainable with a plate voltage of 300 volts. Type 83V is a cathode-type, high-vacuum rectifier designed for full-wave circuits. The heater requires 1.75 amperes at 5 volts. The maximum plate voltage is 350 volts r.m.s. per plate, and the maximum current is 175 milliamperes. This tube is intermediate between type 80 and 5Z3.

Can Man's Skin Act as a Television Machine?

ROME—Professor Giuseppe Caligaris, of the Royal University of Rome, has evolved a theory that man's skin may be a "television" machine. According to latest reports he recently gave a demonstration to prove his theory before Italian scientists. It is said that the Professor, by pressing certain parts of a subject's body, enabled that subject to respond with detailed descriptions of what persons looked like who were standing on the opposite side of a stone wall.

DOTS and DASHES

Short but Interesting Items from the Month's Radio News the World Over

Books That Talk

NEW YORK—The development in the near future of "talking books," along the same lines as the talking motion picture, was predicted recently by Samuel G. Hibben of the Westinghouse Company, in an address before the annual convention of the Society of Motion Picture Engineers.

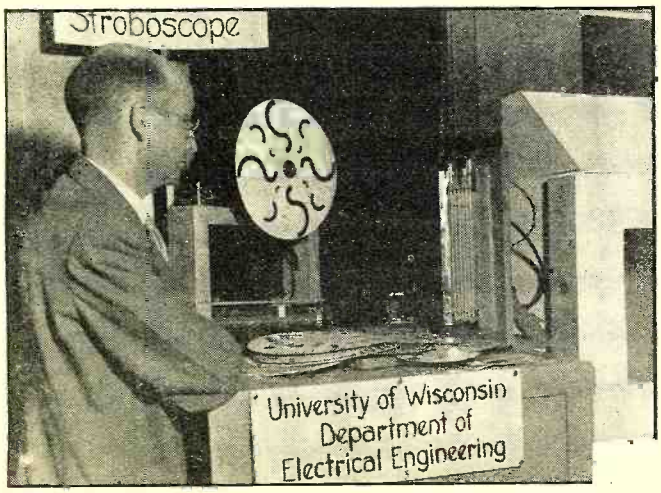
A Real Scientific Treasure Finder

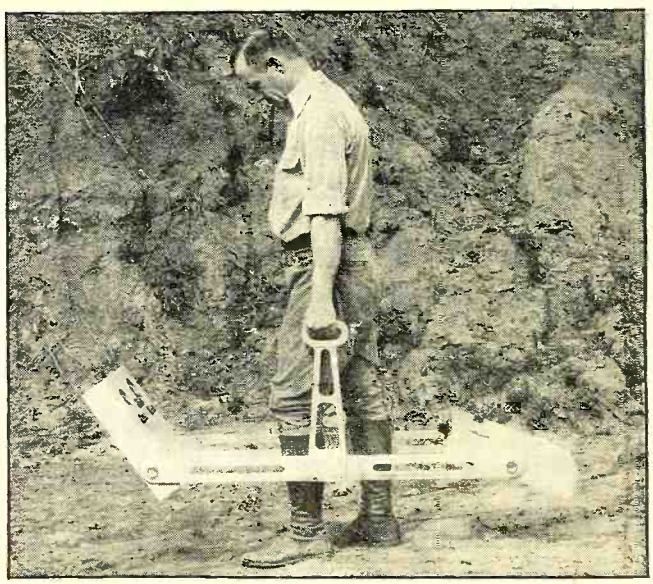
SHREVEPORT, LA.—A new geophysical device, the invention of W. M. Barret, now enables treasure finders to scientifically locate hidden metallic objects buried under ground. It has two handles by which it is carried by the observer who watches dials that detect hidden objects of varying electrical conductivity. A picture of the device is shown on the cover and also on this page. The new instrument contains a high-frequency oscillator and a sensitive detector. It is also equipped with a rugged galvanometer for indicating the varying responses due to the presence of buried objects. If an electrically conductive mass is brought within the effective range of the oscillator as the person holding the apparatus walks slowly over the ground, a reaction is produced in the detector, which shifts the needle of the galvanometer.

The "Terrometer," as the device is named, is admirably suited for the mapping of buried masses of ore, of metallic piping that has been lost, of metallic chests or coffins, or other masses of elements or

IN THE LABORATORY—IN THE FIELD

Below: An experimental set-up for studying high-speed objects. At right: The Terrometer, used to locate buried treasure or minerals





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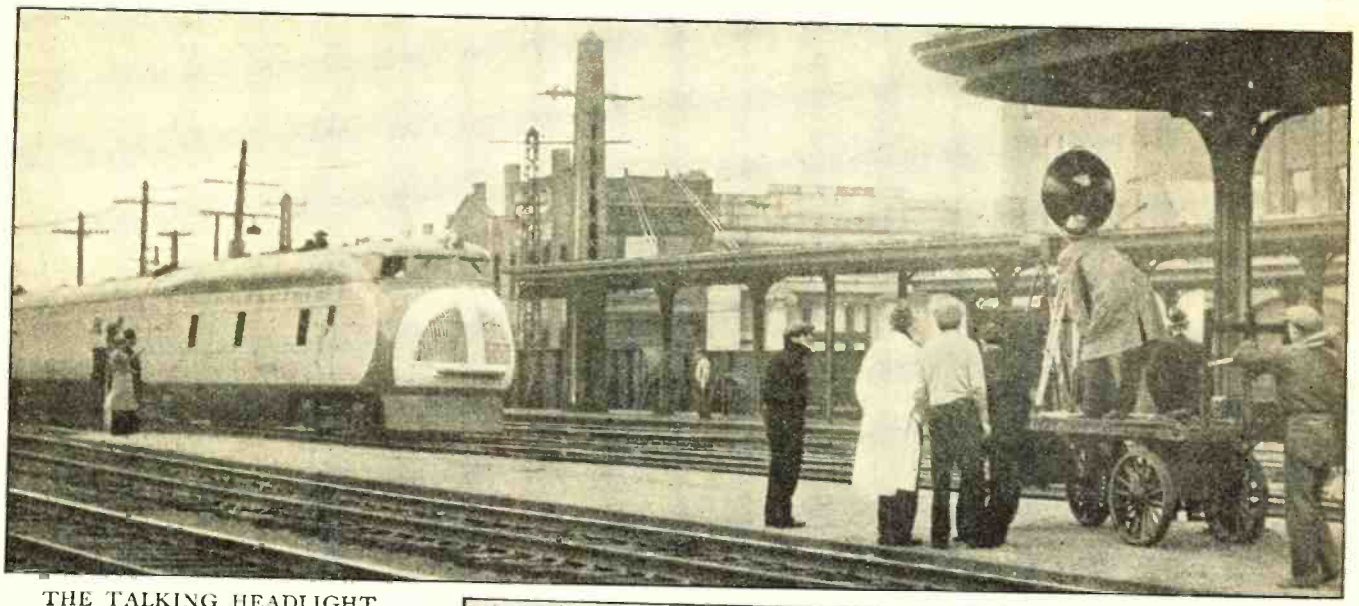


THE TALKING HEADLIGHT

As the Union Pacific streamlined train speeded through this station conversation was projected from the cab to the experimental apparatus set up on a baggage truck on the platform. The voice was transmitted on a beam of light. (*Another illustration on page 463 of this issue*)

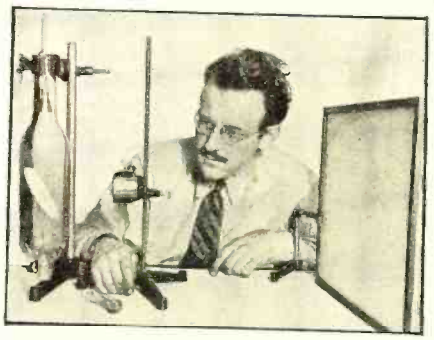
minerals varying in conductivity with respect to the surrounding terrain. The device is being manufactured by the Engineering Research Corporation of this city.

Experiments with ¾-Meter Waves

NEW YORK—Experimenting with ¾-meter waves, generated and received by tiny circuits utilizing the new "acorn" tubes, Edward Glaser, a well-known amateur experimenter, has recently been able to transmit to a distance of a number of miles back-and-forth between his automobile and his home laboratory. This work is being done in association with engineers of the RADIO NEWS laboratory and a complete description of the apparatus evolved will soon be described in this magazine.

Talking Over a Light Beam at 100 Mile an Hour

ALBANY, N. Y.—When the new Union Pacific six-car streamlined passenger train left here for Schenectady recently it had on it a beam search-light that talked. As the train approached the station down the track there might be noticed, on a hand truck on the platform, a tripod-mounted concave mirror and in back of that a loudspeaker system. As the train sped along, there shot out from the cab an orange-red beam, aimed by an operator on the train directly at the concave mirror. Persons on the platform were astonished to hear the loudspeaker "burst into speech" as passengers on the train called greetings to the watching crowd along the tracks. It was the first time that a talking light beam had been used by a railroad.



TESTS MICRO-WAVES

Ed. Glaser, well-known radio amateur, conducts tests on the ¾-meter transmitter and receiver he is shown holding in his hands, between his home and his motor car. He will describe the results of his experiments soon in RADIO NEWS

PROJECTS CATHODE IMAGES

At left: G. T. Schmidling and his experimental set-up involving what he claims is a new principle for television. The image on the cathode-ray tube is projected through a lens to a screen

School Celebrates Twentieth Anniversary

WASHINGTON, D. C.—Toward the end of the year 1914, a little over twenty years ago, four young students sat down to study radio under the guidance of J. E. Smith, first president of the then residence National Radio School. Soon after, the executive forces were supplemented by E. R. Haas, who became its first vice president, and the school was gradually converted into a home study school. During this period of twenty years or more, it has grown from a small two-man organization to one which now employs 125 trained and specialized educators, occupying its own building on Providence Street and having hundreds of students and graduates in every State of the Union, besides fourteen foreign countries. It has an active Alumni Association, numbering four thousand graduates. It has contributed trained men to all branches of the radio industry, many of whom now hold high positions in the field. Its courses today include instruction in every branch of radio, including electronics, television, and the short waves.

Radio Saves an Aviation Pilot's Life

COLUMBUS, OHIO—A few minutes after Ray W. Brown had taken off from (*Continued on page 522*)

RADIO PREVENTS CRASH

A radio message to Ray W. Brown, right, while in the air in this plane told him, "Your landing gear is gone." He did not know it and the message probably saved him from fatal injury

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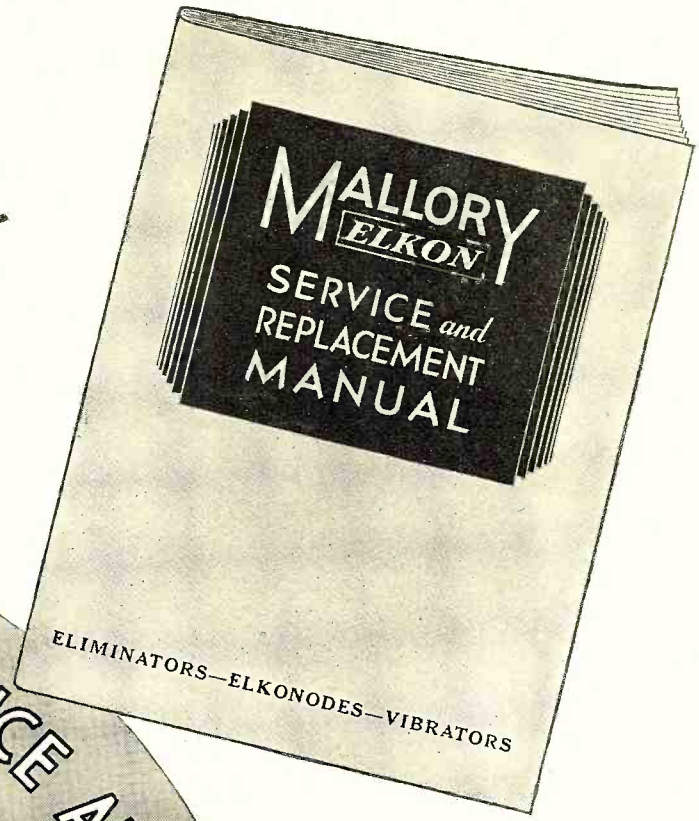
it's Authoritative!
it's Invaluable!



WHEN YOU SERVICE AUTOMOBILE RADIO SETS..... Save Time and Money with this Book

IT'S FREE!

Mallory put information in this manual that will put *money* in the pockets of any man who wants to meet the ever-increasing requirements of the automobile radio industry with greater ease and greater profit! Mallory created a sensation in the vibrator field when it created the famous Mallory Elkonode. Mallory scored again with this remarkable manual which marks a great advance over all former publications. Surely you've heard about it. Certainly you'll want to profit by it—and sending for your copy today is a real move in the direction of *starting the new year right!*

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Radio News
February, 1935

RADIO EXPERIMENTING

(The Editor— To You)

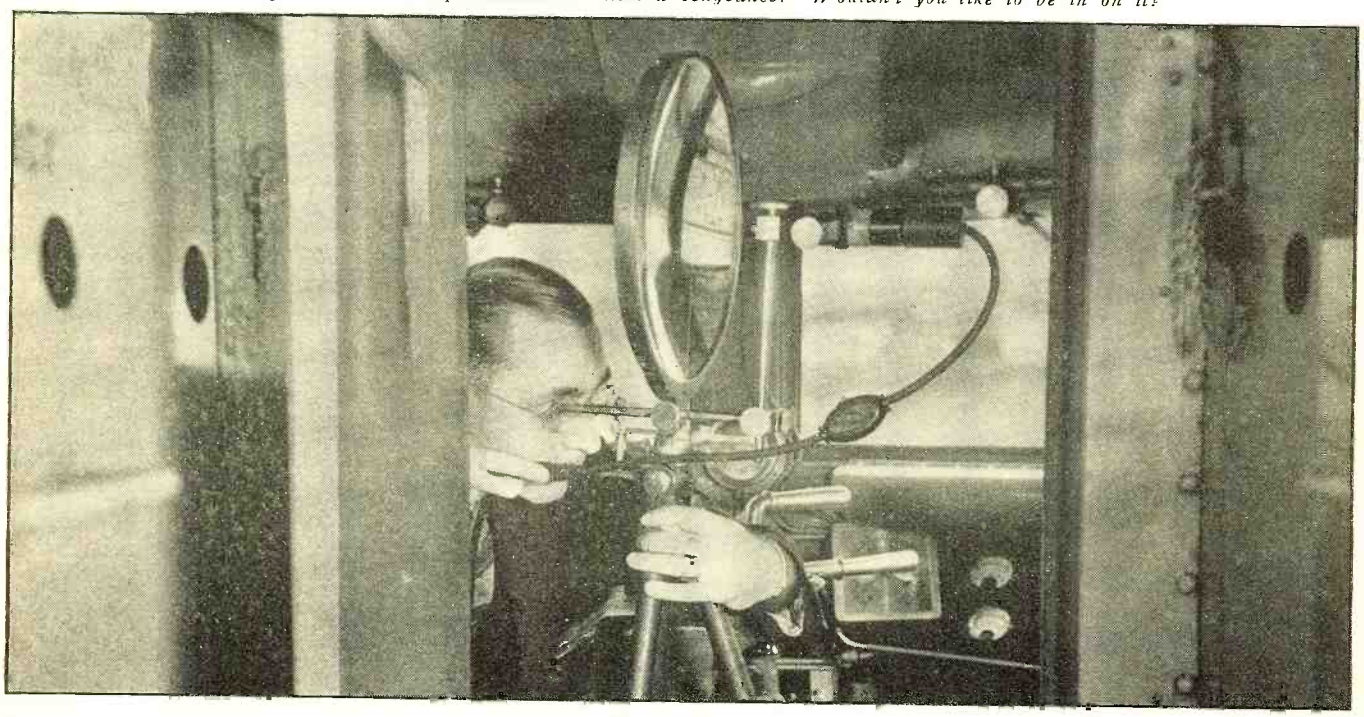
Are you an experimenter? If you are a real radioman, you must answer "Yes," whether you are interested in experimentation as a hobby or from the standpoint of professional business. If it weren't for radio experimenting there would be no radio today. Read this short editorial on the subject

THE Lure of Experimentation has been the force that has motivated most of the fundamental radio inventions that have been made since Marconi's earliest days. That is how he started out and that is what he is doing now—always experimenting! The old adage should read "Once an experimenter always an experimenter"; and you may ask "Who is *not* an experimenter who is *truly* a radioman?" You may be interested in radio simply as an experimental set-builder, at home. That does not prevent you from getting just as much of a thrill out of doing some original experimental work as the professional research engineer, working for one of the large companies in a huge developmental laboratory. No one has a "corner" on brains and if you like radio experimentation—"research" is another name for it—you have just as much chance of making a fundamental discovery as anyone else. It is true that the professional researcher has better "tools" at hand and possibly more experience, but Brains are the greatest "tools" after all.

Radio experimentation may be your Hobby or it may be your Work, and still you always want to know what are the newest developments in radio, in which experimentation is expanding the world's knowledge. Your interests may be in Physical Research or it may be along the lines of Applied Electronics. It may be from an Engineering standpoint, in (*Continued on page* 521)

WHAT'S THIS? SOME NEW TYPE OF SUB-ATOMIC MACHINE GUN IN ACTION?

No! It is simply L. H. Peer, of the G. E. Research Laboratories, "shooting" a beam of light ahead of the U. P. stream-lined train, for transmitting voice signals on the light to a receiver stationed far up the track. Here is exciting and modern experimentation—with a vengeance! Wouldn't you like to be in on it?



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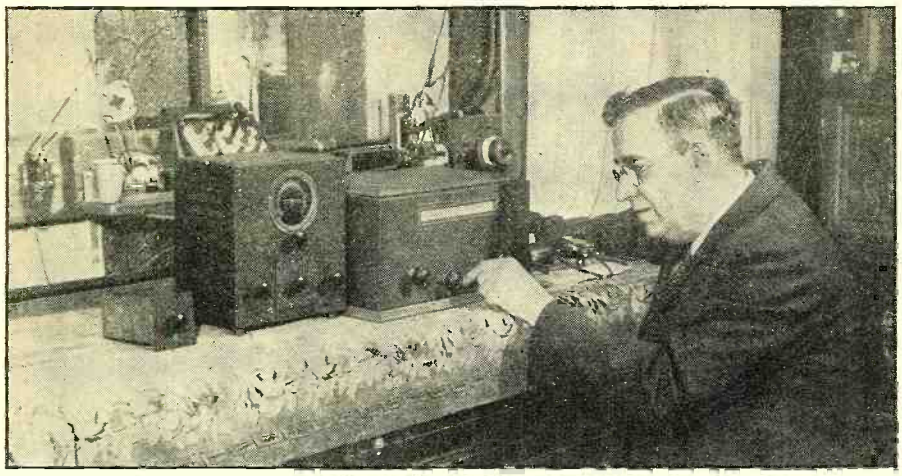


MULTIPLE ANTENNAS FOR SHORT WAVES

A real radio experimenter, Prof. C. W. Bhosys, finds that with a number of separate aerials controlled by switches he can pull in short-wave stations he would not hear on a single antenna

Uses FOUR AERIALS

A. Fenderson

Short-wave signals, picked up by two or more individual aerials connected to a common receiver, often show different fading effects. Great advantage is taken of this phenomenon by a Brooklyn, N. Y., radio experimenter, Charles William Bhosys, a 63-year-old former professor of art, formerly at the International College in Rome. Using four aerials of different lengths and directions, and also four separate grounds, Prof. Bhosys is able to chase an elusive station quite nimbly, and many times he obtains definite announcements out of signals that first appeared to be lost forever. All the aerial and ground connections are brought out to knife switches on the operating table, and all sorts of interesting combinations can be arranged in a few seconds. The main aerial is a 156-foot stretch of No. 10 rubber covered wire. No. 2 also uses this heavy conductor and is 49 feet long. The other two aerials, 39 and 25 feet long, respectively, are made of regular No. 12 wire. All the antennas have Lynch type transposed wire feeders, running to within a few inches of the receiver.

A radio fan of the old school, Prof. Bhosys believes in good grounds. Sacrificing beauty for the sake of science, he dug up his entire back yard and buried four 15-foot pieces of unpainted iron pipe in it, in a vertical position, and packed them with rock salt. Every day he waters the earth as carefully as if he were raising rare plants! That these grounds really are superior to the water piping in the house can be attested by a member of the RADIO NEWS staff who visited Prof. Bhosys and manipulated the switches himself.

When he first tried a short-wave receiver in the house, which is a two-story frame affair, the professor first thought he would never have any luck with foreign reception. The fact that he has traveled all over the world and reads, writes and talks Danish, English, French, German, Spanish, Portuguese, Greek, Italian and a little Russian also helps a lot.

Photo-Cell Amplifier

This highly effective, inexpensive photo-electric cell amplifier, employs a unique circuit. The resistors R3, R4, R5 and the plate resistance of the tube form a bridge arrangement as shown in Figure 2. When the ratio of the arms of the bridge are equal there will be no current flow through R which in this case is the relay. However, if the resistance of the tube shown as Rp, should change, the bridge becomes unbalanced and current flows through Rp thence to R and R4 and back to the power supply. This change can take place when the grid bias on the 47 tube is varied, the effective resistance between the filament and the plate will change accordingly, and it will cause current to flow through R, (relay).

In operation there will be a voltage developed across R2, this voltage will be impressed on the circuit consisting of the photo-cell and R1. The voltage will divide across these two elements according to their resistance. For instance, if the resistance of R1 is 5 megohms and that of the cell is 5 megohms then the voltage will divide equally between the elements. However, the drop across R1 acts to bias the grid of the 47 tube in a negative direction, and when the resistance of the photo-cell changes as it will when light shines upon it, there will be a greater voltage developed across R1 which raises the bias of the tube and consequently increases the plate resistance which in turn will cause current to flow through the relay.

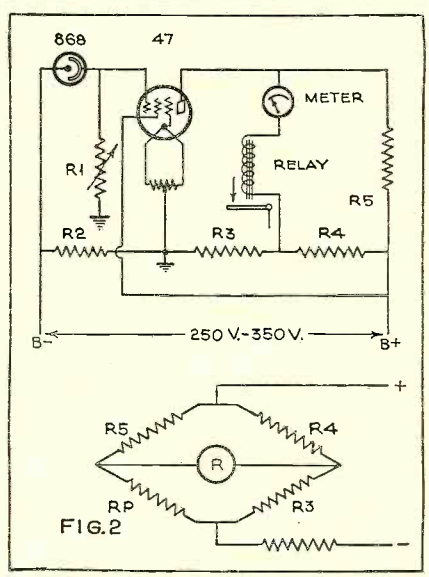


FIG. 2

Employing a good photo-cell, I have been able to obtain a variation of the current through the relay, as high as 10 mas. at 10 volts. I use the type 868 tube, but equally good results are obtainable with others such as the selinium, potassium or magnesium type cells.

The resistor R1 should be variable in order to balance the bridge circuit. This resistance should be kept as high as possible. The relay was made from a telephone bell magnet and its resistance is approximately 1400 ohms. The resistance of the meter is about the same as the relay. Where a sensitive relay is used the meter is necessary, so that the current can be adjusted to zero point.

A two-volt or six-volt type tube may be used instead of the 47. A 43 type tube with a 25Z5 voltage doubling rectifier tube could be employed with equal success.

There is no reason why the amplifier could not be used in sound work, providing all resistors are thoroughly by-passed.

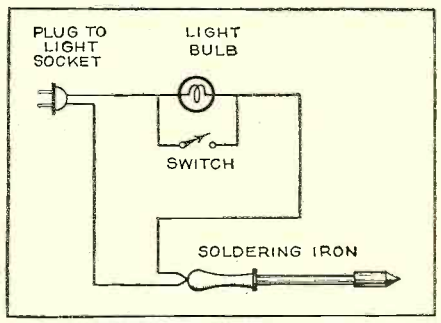
The value of parts, for use with the type 47 tube, are: R1, variable resistance, 10 megohm; R2, 2,000 ohms, 10 watts; R3, 40,000 ohms, 5 watts; R4, 10,000 ohms, 5 watts; and R5, 5,000 ohms, 10 watts.

ALLEN EPSTEIN,
New York City, N. Y.

With the

The Care of Soldering Irons

If a soldering iron is left connected to the supply line for hours at a time the tip generally blackens very quickly, becomes pitted and in a very short while it is necessary to obtain a new tip for the iron.



PROTECTS IRON TIP

The accompanying circuit shows an arrangement to overcome this condition. The procedure is to connect the plug to the light line, close the switch S, and the iron is connected directly across the line so that it reaches a satisfactory operating temperature quickly. When this temperature is reached the switch is then reopened, which puts the electric light in series with the iron, thereby reducing the voltage so as to maintain correct temperature without overheating, even though the power be left on for hours.

The wattage of the electric light bulb depends upon the soldering iron. I use a 75-watt lamp. The switch may be almost any type, although it is a good idea to use some kind of an enclosed switch made for use on 110-volt lighting circuits. Using this method, the tip of the iron will remain tinned for a long time and you can obtain better soldering jobs.

NATHAN PAINE,
Yonkers, N. Y.

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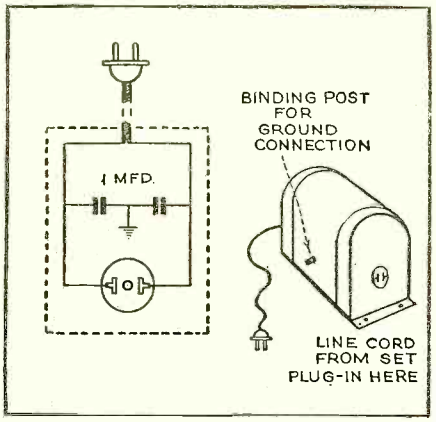
EXPERIMENTERS

Conducted by William C. Dorf



Line Noise Filter

It has been proven in many cases that hum is caused by an ineffectively grounded lighting circuit. As an example, where the lighting line is grounded at a point far removed from the radio set installation a steady hum is frequently encountered and is directly traceable to the power lines.

The simplest type of line filter will in some cases cure this trouble and a unit of this kind can be quickly and easily made from parts generally found in any service man's shop. An old discarded relay box lends itself very nicely to the idea as it contains the necessary input line socket and the line connecting cord. Simply remove the relay and install and connect the two—1.0 mfd. condensers, rated at 150 volts a.c. to the plug and socket as shown in the drawing. Be sure to use a good ground, preferably a wire tightly clamped to a water pipe which has been previously scraped clean. Connect this wire to the ground post on the filter box.

R. F. LAMBERT,
Detroit, Michigan

Unusual Books for Experimenters

Industrial Electronic Tubes. Course Number 25; published by Westinghouse Electric and Manufacturing Co. This book is a 217 page course of study on the principles of electronic tubes. The instruction covers practically all kinds of tubes such as: mercury arc rectifiers, high-vacuum rectifiers and amplifiers, grid-glow tubes, and ignitron, various kinds of photocells, cathode-ray tubes, x-ray tubes and glow lamps. The fundamental properties of each tube is first explained and several industrial applications are described. The text should be easily understood by the radio-experimenter and will suggest to him many new possibilities.

Manual of Experiments; Course 26. This is a guide to experiments to be performed by the student of course 25 and is designed to bring out the fundamental principles of electronic tubes.

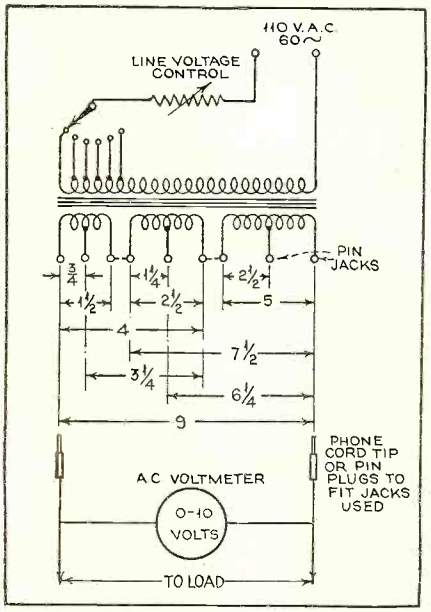
For prices or other information on these two books write to the above company at East Pittsburgh, Pa.

Filament Transformer Providing Eleven Different Voltages

Herein is shown a method for utilizing a filament transformer to provide eleven different voltages which will take care of practically all the tubes on the market today. Employing a transformer having but three secondary output windings of 1½, 2½ and 5 volts, it is possible to provide, by an interconnecting arrangement of these three voltages, eight additional voltages ranging from ¾ volt up to 9 volts.

Originally the idea was applied to a tube tester. However, in its present arrangement of pin-jack connections it is employed to supply various voltages for the operation of test lamps, door-bells, oscillators and numerous other electrical devices and testing equipment.

The transformer, the voltmeter, the Clarostat line-voltage control, pin-jacks,



and tap-switches are all mounted on a 7-inch by 10-inch Masonite Crestwood panel. By adjusting the line-voltage control in conjunction with the tapped primary winding it is possible to obtain fractional intermediate values.

If the transformer has a fourth secondary winding, this same idea can be extended with additional interconnecting points and the necessary pin-jacks to provide increased voltage ranges.

C. M. DELANO,
Lincoln, Neb.

Amateur Network

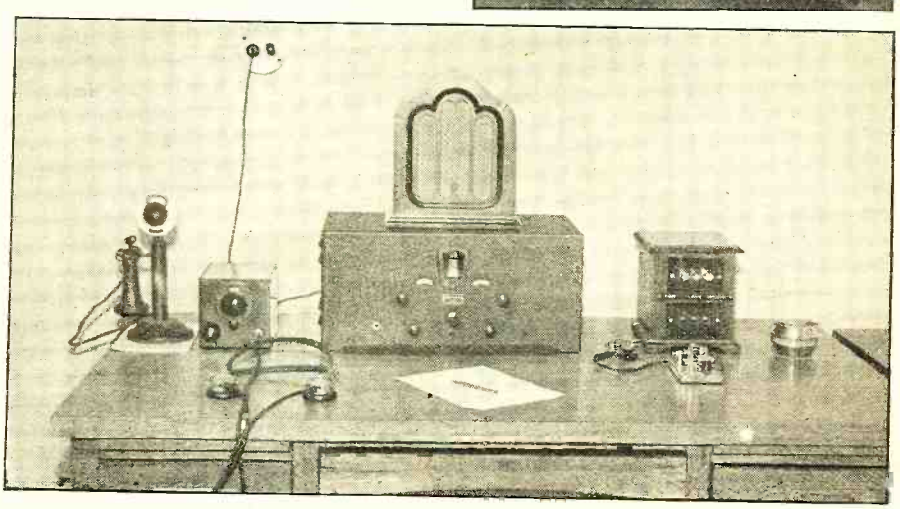
The Second Corps Area net control station of the Army Amateur Radio System, W2SC-WLN, went on the air October 8th, 1934, with a powerful new transmitter, and is now very active on the 3.5, 7, and 14 megacycle bands. This experimental station is housed in a small building of its own in historic Fort Jay, on Governors Island, in New York harbor, and is operated by regular Army personnel and local of the A.A.R.S. The new transmitter, specially built by Kaltman & Romander of Newark, N. J., is a crystal-controlled, three-stage job with an output of 300 watts. Completely self-contained, it stands only four feet high, a foot and a half wide and two feet deep. The receiver is a Hammarlund "Pro." The antenna is a half-wave Hertz about 135 feet long, with Zepp feed.

Neat, simple and compact, without frills or fancy gadgets, W2SC-WLN is already making a reputation for itself as a model station. It signs W2SC when operated in the amateur bands and WLN when used on specially authorized Army Amateur fre-

(*Continued on page* 515)

ARMY AMATEUR RADIO SYSTEM

At right: The new transmitter on Governor's Island, with Private Philip Poudrier, Signal Corps operator in charge. The call letters are W2SC and WLN. The illustration below shows the receiving desk, with receiver, loudspeaker, transmitter, control board, and operating keys



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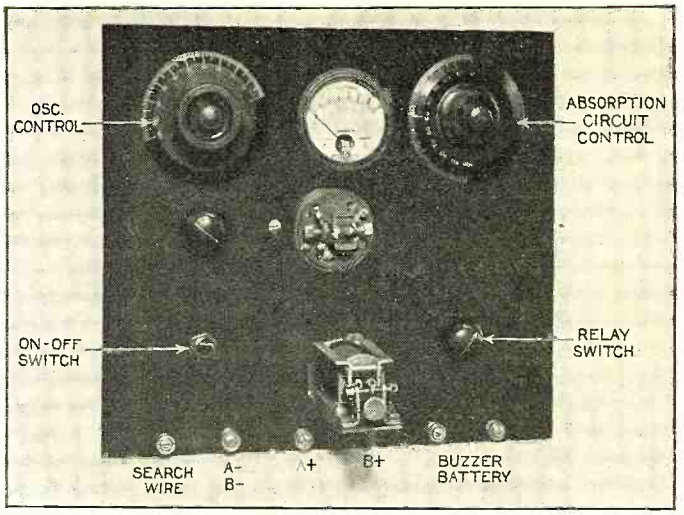
How to Build a Simple

ELECTRONIC ALARM

This simple device, made largely of parts from the radio scrap pile, has real utility as an alarm system, and affords considerable amusement as a scientific toy



FRONT VIEW OF THE ELECTRONIC ALARM

John D. Reid

THE electronic alarm system described here may be used to sound an alarm; upon the approach of a person within a protected area, with the advent of rainfall, in case of fire, or, whenever such a change occurs as may be utilized to produce a frequency shift of a small magnitude, in a tuned circuit. Only a few parts are used in the device and it may be built in a few hours. The total cost is estimated to be under ten dollars, the major portion of which goes for a sensitive relay which will operate on a few milliamperes change in current.

The principle of operation is as follows. The large percentage change in a vacuum tube's plate current, between an oscillating and non-oscillating condition, is used to operate a relay which closes an alarm circuit. To accomplish this it is necessary to produce a change which will either stop or start an oscillator.

An oscillator may be "stopped" by absorbing sufficient power from it. The method used here is to couple to the oscillator a circuit tuned to a slightly lower frequency and to adjust the coupling, so that when the oscillator is then tuned down to this frequency, sufficient power will be absorbed to stop the oscillation. One side of the tuned circuit used in the oscillator is connected to ground. The other side is connected to a wire strung about the borders of a room (assuming we are protecting a room). Any person entering the room will increase the capacity between this wire and ground, thus shifting the oscillator to a lower frequency which, in turn, will cause it to stop. The resulting change in plate current then operates the relay which closes the alarm circuit. This mode of operation is the more sensitive, as compared to starting the oscillator, because as power is absorbed a change in plate current results so that, with a sensitive relay, operation can be obtained without entirely stopping the oscillator and therefore requiring only a very small shift in capacity.

With the search wire connected to the absorption circuit and this circuit tuned so that it absorbs sufficient power to stop the oscillator, then an increase in capacity will detune the absorption circuit allowing the oscillator to start. This mode of operation gives greater stability and avoids the possibility of interference due to radiation of the oscillator.

Figure 1 gives the schematic diagram of the electronic alarm circuit utilizing a type –30 tube. The external search wire is connected to either point X or point Y depending upon which mode of operation is desired. With the circuit constants given, the frequency of oscillation will be between ten and twenty megacycles but the frequency is unimportant and the experimenter may substitute any pair of like coils for L1 and L2, changing L3 so as to obtain oscillation. The coupling between L1 and L2 should be capable of rough adjustment, a variation in spacing of from one-half to two inches being sufficient. The meter in the plate circuit is not essential but is of great value in indicating the strength of oscillation thus showing the optimum setting for the absorption circuit. The tuning condensers may be varied from the sizes given, the only necessity being that they have a capacity somewhat greater than that added to the circuit to which the search wire is connected, this circuit having its condenser set close to minmum capacity. Circuit stability is increased by using parts of like construction for each circuit as then changes due to temperature and humidity will have equal effects. With the voltages given and a typical type-30 tube the oscillating current will be approximately 4 milliamperes and the non-oscillating current approximately seven milliamperes. Thus a relay which will operate on a change of three milliamperes will be required.

Figure 2 gives the schematic diagram of a power supply which would eliminate the batteries required in Figure 1. The glow tubes stabilize both plate and filament voltages eliminating variations in line voltage. Two are required as the current requirements exceed the regulation range of one.

Several uses of the alarm device suggest themselves. An arrangement suitable for indicating rainfall would consist of a pie-plate as the grounded electrode with a smaller disc, insulated by a small bakelite spacer, mounted in the center and connected to terminal X of the alarm device. The whole assembly is mounted on (*Continued on page* 515)

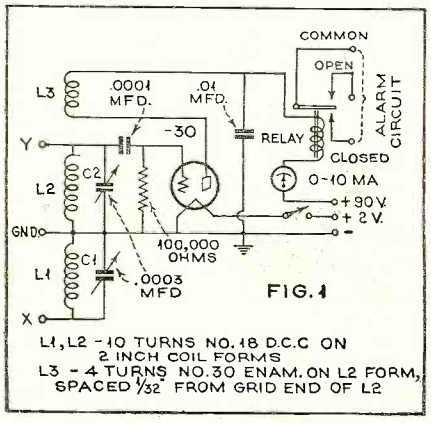
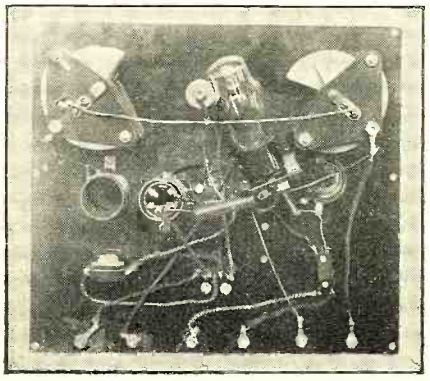


FIG. 1

L1, L2 - 10 TURNS NO. 18 D.C.C. ON 2 INCH COIL FORMS
L3 - 4 TURNS NO. 30 ENAM. ON L2 FORM, SPACED 1/32" FROM GRID END OF L2

REAR VIEW



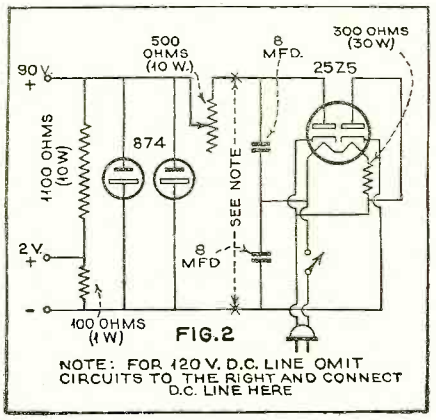


FIG. 2

NOTE: FOR 120 V. D.C. LINE OMIT CIRCUITS TO THE RIGHT AND CONNECT D.C. LINE HERE

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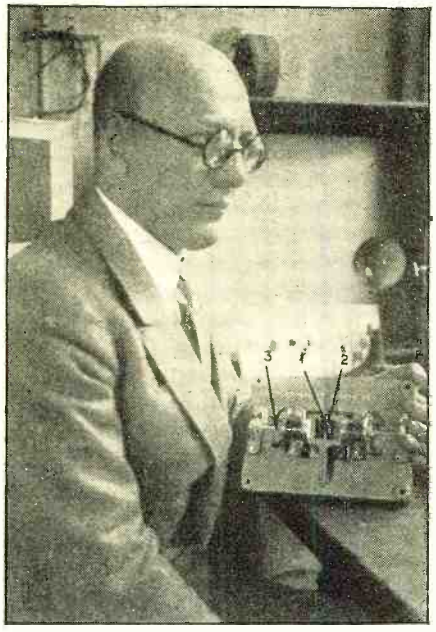


The New Priess

TELEVISION SCANNER

A new scheme in "scanning" with a periodic system of vibrators in which the process is a continuously progressive one back and forth

Elmore B. Lyford

RADIO has had at its disposal for some time, now, practically everything that it needs for successful television transmission and reception except a good, cheap and rugged scanning device. Radio engineers working on this problem have recognized that the lack of such a scanner is really the "neck of the bottle" and are concentrating the bulk of their efforts along this line. A dozen important developments along the line are going forward in as many different laboratories at the present time, and at least one of these developments has reached the stage at which it can be announced. This is the so-called "periodic scanner" which is the work of Mr. William H. Priess. This particular scanner differs radically from either the Nipkow disc or the cathode-ray tube, and incorporates in its design several novel features.

In its essentials, this new Priess scanner consists of a small metal mirror which, by electro-mechanical means, is made to vibrate in two different planes simultaneously, thus reflecting a beam of light to all parts of a receiving screen. The light beam may come originally from an incandescent or an arc lamp, and may be modulated by a Kerr cell or other similar arrangement —these things have already been done.

It is the design and operation of the scanner itself which is new and of the greatest interest. In its details, this scanning unit consists of a small metal mirror, about ¼ inch square, firmly attached to the middle of a steel wire about three inches long. This wire is mounted in a special frame, held tightly at both ends, and caused to twist back and forth slightly by means of a magnetic field generated in a coil mounted behind the mirror, and acting upon a small vane attached to the back of the mirror. When a beam of light is focussed upon the mirror, this twisting motion causes the beam to "sweep" back and forth across any screen upon which it may be reflected.

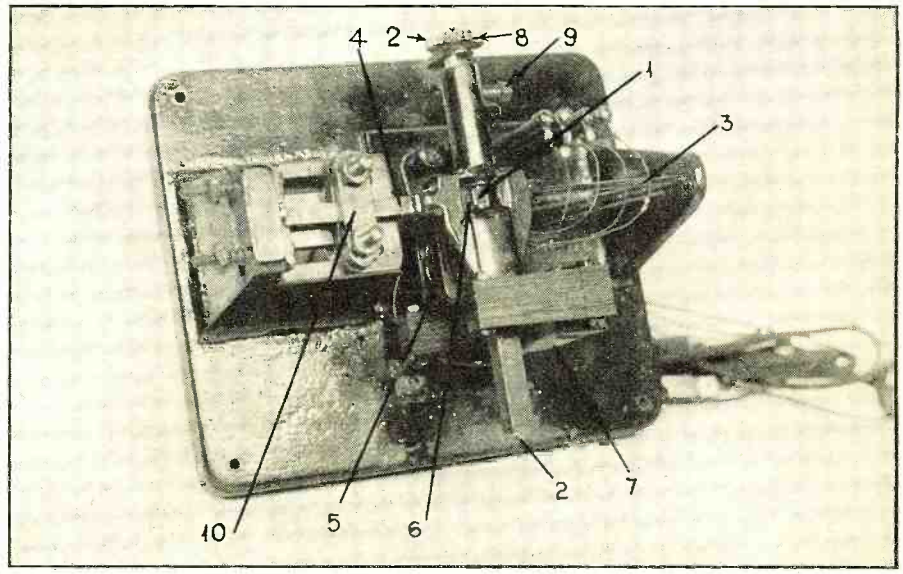
Simultaneously with this action, the entire frame which holds the wire is caused to tip backwards and forwards slightly, by a similar coil arrangement. This action is relatively much slower, is in a direction at right angles to the twisting motion of the mirror, and causes the reflected beam to "sweep" up and down upon the screen to which it is reflected. The two actions of twisting and tilting happening together cause the beam of light to be reflected or "sprayed" to all parts of the receiving screen, in regular progressive order—just what is needed in television scanning.

The frequency of the twisting motion is controlled by the length and stiffness of the steel wire on which the mirror is mounted, and is adjusted to be about 5000 cycles-per-second in the models which Mr. Priess is now using. The tilting action of the frame is likewise controlled by the mass and stiffness of the assembly—just as in the case of a tuning fork—and is adjusted to have its natural period at a frequency of 24 cycles-per-second. The scanning direction is different from that obtained by the use of a Nipkow disc—straight across the screen, always in the same direction—but much like the results obtained by the use of a cathode-ray tube, i.e., back and forth across the screen working from top to bottom, and then from bottom to top. At the frequencies being used at present, there are 10,000 lines to be divided among 24 double frames-per-second, or a definition of about 200 lines-per-picture (horizontal). The definition-per-line will depend, of course, upon the efficiency of the transmitting and receiving devices and modulating system, but can be made equally as fine without any great technical difficulty. The net result promised by Mr. Priess is a picture three feet square, with the definition and brilliance of the average home-movie projector.

Most important of all in the design of this scanner, perhaps, is that the twisting motion of the wire and the tilting motion of the frame both come, as has been pointed out, at the natural periods of the wire and frame respectively—that both motions are essentially periodic. Operation at these natural frequencies, rather than at some artificial frequency, (*Continued on page* 509)

PARTS OF THE UNIT

The various components are as follows: 1, Oscillating mirror; 2, high-speed torsional rod for line frequency; 3, low-speed torsional rod for frame frequency; 4, variable elasticity for tuning frame frequency; 5, polarizing coil; 6, line frequency magnet; 7, frame frequency magnet; 8, variable elasticity for tuning frame frequency; 9, lock for setting line frequency; 10, lock for setting frame frequency



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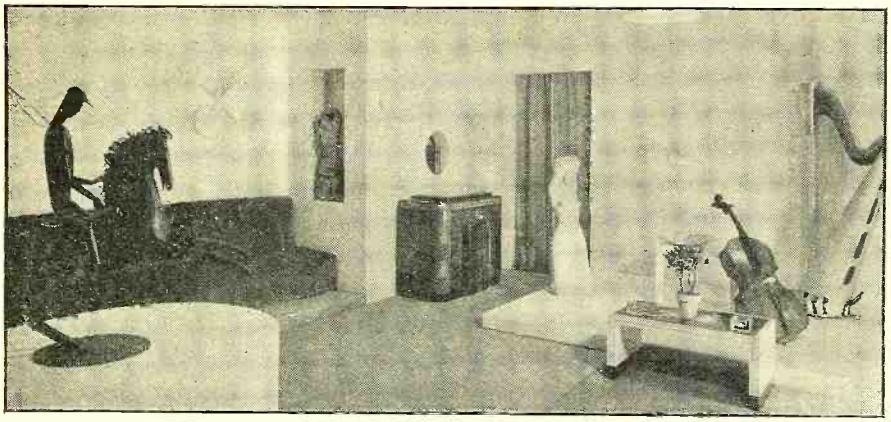


RADIO MUSIC ROOM
An artistic creation by Contempora, Inc., as its contribution to the recent Philco Exhibition, at Rockefeller Center, under the auspices of the National Alliance of Art and Industry

RADIO MUSIC ROOM

(In the Style Moderné)

Frederick Siemens

WITH constant technical advances in radio, engineers have been giving more and more attention to improvements in cabinet design. A movement is now under way to have interior decorators take advantage of the new cabinet treatments by planning entire rooms in the motif of the radio cabinet design.

Some radio receivers, although handsome objects, lose their eye appeal when placed in rooms of radically different decorative treatment than the cabinets. The care and expense of many manufacturers in turning out cabinets that virtually rank as works of art is tending towards the radio receiver being the basis of home decorative schemes.

The movement was recently launched in New York for the introduction of a new type of radio room in American homes. An exhibition was held in Rockefeller Center, under the auspices of the Philco Radio & Television Corporation, to demonstrate the beautiful effects obtainable in a "radio music room." Five outstanding decorating firms were represented at the display with original model rooms providing appropriate atmosphere for radio entertainment.

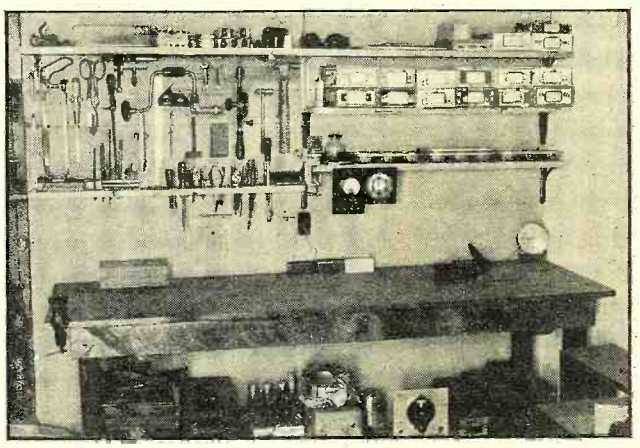
The exhibit was supervised by Mr. Cleon Throckmorton and had as sponsors the National Alliance of Art and Industry and a special committee. Participating decorators, each represented by a model radio room, included: L. Alavoine & Co., Inc.; Elsie de Wolfe, Inc.; Stair & Andrew, Inc.; French & Co., Inc., and Contempora, Inc.

Sponsors of the exhibit declared that the display was inspired by growing recognition that, with the advancements in radio reception, the receiver has come to occupy a prominent position in homes, thereby demanding the attention of home owners.

The types included in the display were a seaside cabana lounge, a modern musical room (illustrated) and three Eighteenth Century French and English rooms.

A Neat WORKSHOP *for the* SET BUILDER

Robert Hertzberg



EXPERIMENTER'S SHOP
Above the work bench are the shelves holding tools, testing instruments and hardware supplies. The shelf below is used for storing spare parts and apparatus

THOUSANDS of radio fans experience keen delight in building their own broadcast and short-wave receivers, but comparatively few of them pay sufficient attention to the tools they use every day in pursuit of their hobby. Many people who think nothing of paying five dollars for a high-grade variable condenser or six dollars for a pair of plug-in coils use cheap, inadequate drills, pliers and wrenches for mounting these. Not infrequently serious electrical difficulties develop in anotherwise good circuit because of improper mechanical treatment.

The most complicated receivers and transmitters can be built with the aid of simple hand tools—of the right kind. While power-operated tools, such as lathes and drill presses are highly desirable, most radio fans haven't room for them and would rather spend the money on new tubes or amplifiers. All the tools needed for even advanced experimentation and construction can be hung comfortably on a board only four feet long and two feet wide, as shown in the accompanying photograph of a typical cellar radio den.

The owner of this neat little workbench has been a radio fan for seventeen years, has gone through every phase of the game, from crystal detectors to crystal oscillators, and has owned enough radio equipment to stock a store. He has been simplifying his tool and bench facilities over a period of years and finds the present arrangement exceedingly convenient. Perhaps other radio experimenters can save time and money by studying the layout and adapting it to their own requirements.

The general idea is to have all tools within easy reach, yet off the workbench itself. The screwdrivers, pliers and spintite wrenches, which are the most frequently used tools, are kept in holes and slots in a bottom shelf four inches wide and the full length of the tool board. The latter holds an easily recognizable assortment of inexpensive tools: drills, files, hammers, saws, chisels, rules, wrenches, etc. These are hung merely on nails, so that they can be removed and replaced quickly.

Two indispensable tools are a circle cutter, for making socket and meter holes in metals or wood, and a ten-cent pair of imitation surgical forceps. The latter, available at all chain stores, is extremely useful for holding and picking up small parts. For many purposes it is far superior to a pair of pliers because its jaws are operated by a strong spring. In soldering operations it will save many burned fingers. Another valuable tool is a six-inch adjustable jaw wrench, for tightening the large hex nuts on potentiometers, variable condensers, etc.

On the table, not to be overlooked, are a man-sized vise and a husky electric soldering iron. The iron is kept on a simple stand made by driving two large nails into a block of wood to form a wide X.

The workbench itself, home-made, with a saw and a hammer, is six feet long and 23 inches wide, the top consisting of three lengths of so-called "eight inch" shelving. The legs are common 2 x 4's. Between the legs, at the bottom, is a generous fifteen-inch shelf on which batteries, power packs and other heavy items are placed. This whole table cost less than three dollars.

One long shelf above the tool rack and

(*Continued on page* 516)

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New Broadcast

CONTROL DESK

Samuel Kaufman

A UNIQUE instrument board which eliminates the need for countless separate devices of varied size has been constructed by engineers of the Columbia Broadcasting System for the use of Edwin K. Cohan, the network's technical director.

The centralized unit has been built into a low cabinet somewhat like a table-model receiver. It is studded with dials, switches, plugs and meters in order to serve a manifold engineering purpose.

In the center, there is an electric clock —correct time being one of the chief factors in broadcast engineering. Two hinged doors at either end of the unit open downwards. The doors serve as bases for telegraph keys through which Cohan clicks out instructions to his staff. The key at the left is connected to a Morse line extending to basic network stations while the one at the right sends instructions to engineers within the CBS Building.

The automatic telephone-type dial at the right has coded numbers to bring in the choice of outside local stations or CBS programs off the landline circuit and off the air. A volume control knob and an "on-off" button are right below the dial.

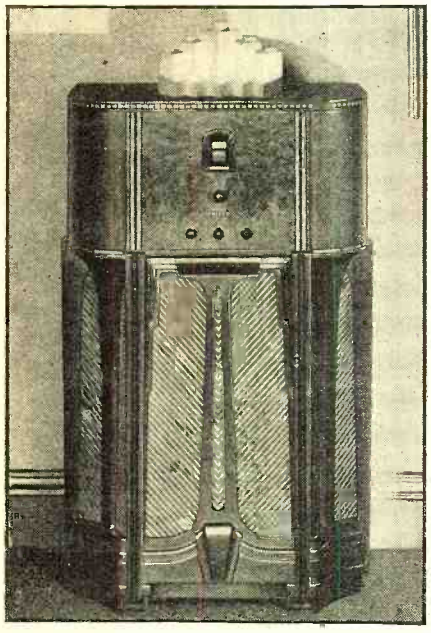
Inasmuch as Cohan frequently talks with the Byrd Antarctic Expedition at Little America via short waves, the instrument board also includes microphone monitoring equipment. Directly to the left of the clock is the needle volume indicator connected to the desk microphone. The dial at the right of the clock enables the technical director to do his own monitoring should this be necessary or desirable.

The two additional visual sound indicators serve to denote how the network programs are going out. One of the indicators ie connected to the telephone line feeding the program to chain outlets while the second shows how the WABC local programs are being received.

Three parallel switches at the left are used to control microphones, loudspeakers and receiving equipment located elsewhere in the room.

HE CONTROLS A BROADCAST CHANGE

This is E. K. Cohan, shown at his especially constructed desk, with control equipment arranged so that he can listen to any program and talk direct to all operators



HIGH-FIDELITY RECEIVER

This is the Philco Model 200X that was used in the tests

HIGH-FIDELITY RECEPTION TESTS

John Strong

ONE of the engineering highlights of the radio season was the introduction by Philco of a receiver covering the entire musical range from 50 to 7500 cycles. The Model 200-X high-fidelity receiver was perfected through numerous scientific improvements, including newly-designed r.f. and i.f. circuits, a special loudspeaker, a sound-beam "diffuser" and a sound-diffusing cabinet. These developments unite with other engineering treatments to make possible the wide-channel reception. The engineers point out that tonal quality is no longer limited and some instruments have stopped blotting out the sounds of others.

Ten tubes are used in the receiver. The super Class A audio system gives an undistorted output of 15 watts. The set functions on alternating current. The valves include three 78's, three 42's, and one each of the following: 6-A-7, 75, 37 and 5-Z-3.

Supplementing the usual tuning and volume-control knobs are a fidelity-selectivity control dial and a bass compensation knob. The most important adjustment is the fidelity-selectivity control and the best position for the dial depends on the type of station and the type of program. It should be kept in mind that programs vary in the amount of musical range they contain and that many stations have a maximum frequency range below that of the receiver. Also, the transmission of chain programs over wire-lines limits the sound frequency to about 5,000 cycles. The exact amount to turn the knob therefore depends on the station and the program. When the knob is at the extreme right it is at the high-fidelity position. Best reproduction is obtained when this knob is turned as far to the right as possible without the bringing in of any interference.

(*Continued on page 520*)

MICROPHONE HEADLINERS

Lucrezia Bori, famous operatic soprano, and Boake Carter, equally famous news commentator, at the microphone during the test and demonstration in the Grand Ballroom of the Waldorf-Astoria

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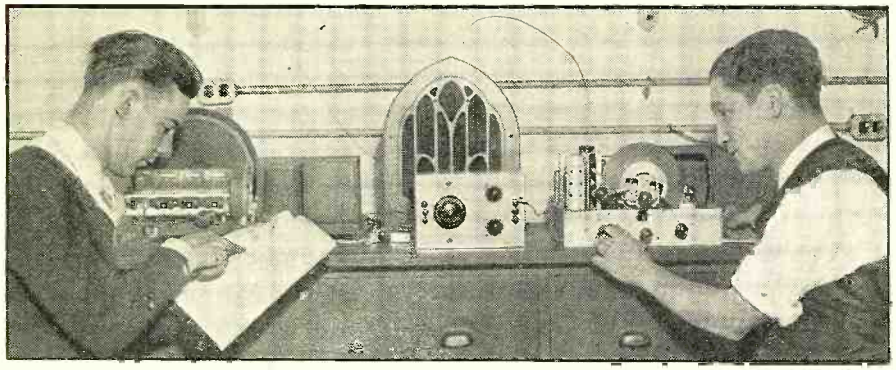

THE DX CORNER

(For Broadcast Waves)

S. GORDON TAYLOR

THE number of Official Listening Post Observers is gradually increasing so that now a fair coverage of the U. S. has been obtained, as well as a number of foreign countries. However, there is room for two or three times this number of official observers both in the United States and in other parts of the world. Applications will, therefore, be welcome.

This month, for the first time, is shown a consolidated list of foreign stations heard by Listening Post Observers. If this form of listing meets with the approval of readers of this department, it will be continued. It is felt that listing in one group all of the foreign stations heard, in the order of frequencies, offers maximum aid to DX'ers. If Official Listening Post Observers or other readers feel that some other method of listing would be more helpful to them, it is hoped that they will submit their comments and suggestions. Gradually as more detailed reports of reception start to come in from observers, the number of columns in this list will be increased to take care of additional geographic areas. With the cooperation of all observers it is hoped that eventually this listing will cover a wide enough territory to be applicable by listeners in every section of the U. S.

The "Station Locations List" is another feature which will probably be continued monthly. In it an attempt is made to show every foreign station (and a few unusual domestic stations) reported heard by readers. This list gives locations and power for all stations listed in the consolidated report list, as well as the stations mentioned in the individual reports quoted in this department each month.

Advance DX Calendar

The following is a list of coming special and regular DX broadcasts, gleaned from the monthly publications of the various DX Clubs and from reports of Official Listening Post Observers. Especially helpful have been the publications of the International DX'ers Alliance (IDA), the National Radio Club (NRC), the New England Radio Club (NERC), the Newark News Radio Club (NNRC), and reports from Observers Kimmons, Everly and Kalmbach.

All hours are shown in Eastern Standard Time. Where DX programs are dedicated to individual clubs, the initials of the clubs are given at the end of such items.

Special Broadcasts

Jan. 5, Sat., 7:30-9 p.m., Fecamp, France, 1456 kc., 10 kw., IDA
Jan. 6, Sun., 2:05-3:05 p.m., LR5, Buenos Aires, 830 kc., 25 kw., NNRC
Jan. 6, Sun., 3:10-5:10 a.m., HIX, Santo Domingo, D.R., 1270 kc., 1.5 kw., NRC
Jan. 10, Thur., 1-2:30 a.m., EAJ7, Madrid, Spain, 1095 kc., 10 kw., IDA
Jan. 10, Thur., 10 p.m.-12:30 a.m., Cairo, Egypt, 621 kc., 20 kw., IDA
Jan. 10, Thur., 4:30-5:30 a.m., 10BP, Wingham, Ontario, 1200 kc., .025 kw.
Jan. 12, Sat., 8:30 p.m.-1:30 a.m., Rochester, 1150 kc, 50 kw., IDA-NNRC
Jan. 13, Sun., 2-3 a.m., XETH, Pueblo, Mexico, 1210 kc., 1 kw., NRC
Jan. 15, Tues., 1-4 a.m., WDAY, Fargo, N. D., 940 kc., 1 kw.
Jan. 16, Wed., 12:01-2:00 a.m., CTIGL, Parede Portugal, 1031 kc., 5 kw., IDA
Jan. 18, Fri., 11 p.m.-5 a.m., KGVO, Missoula, Montana, 1200 kc., .1 kw., IDA
Jan. 20, Sun., 1-2 a.m., P.P., Paris, France, 959 kc., 100 kw., IDA
Jan. 22, Tues., 2-3 a.m., LS2, Buenos Aires, 1190 kc., 40 kw., IDA
Jan. 25, Fri., 10 p.m.-12:30 a.m., Cairo Egypt, 621 kc., 20 kw., IDA
Feb. 3, Sun., 2:05-3:05 a.m., LR5, Buenos Aires, 830 kc., 25 kw., NNRC
Feb. 6, Wed., 2-3:30 a.m., Toulouse, France, 913 kc., 60 kw., IDA
Feb. 10, Sun., 2-3:30 a.m., LR5, Buenos Aires, 830 kc., 25 kw., IDA

Periodic Broadcasts

Daily except Sundays—8:30 p.m., WTRC, Elkhart, Ind., 1310 kc., 50 kw.

Mondays (except first week in month)—WHEF, Kosciusko, Miss., 1500 kc., .1 kw. Begins 1 a.m.

Tuesdays, 1-2 am., CMBC, Havana, Cuba, 1040 kc., .15 kw. (Weekly.)

Wednesdays (except first week in month)—WHEF, Kosciusko, Miss., 1500 kc., .1 kw. Begins 1 a.m.

Fridays—2:45 p.m., WORK, York, Pa., 1320 kc., 1 kw. (Weekly DX tips.)

Saturdays—12:30-1 a.m., KDKA, Pittsburgh, Pa., 980 kc., 50 kw. (Weekly DX tips.)

Saturdays—2:30-3 a.m., KFI, Los Angeles, Calif., 640 kc., 50 kw. (Weekly DX tips.)

Saturdays—4-6 a.m., KGBU, Ketchikan, Alaska, 900 kc., .5 kw. (Weekly.)

Sundays, 1-3 a.m., CKMO, Vancouver, B. C., 1410 kc., .1 kw. (Weekly.)

Sundays—3-3:45 a.m., XEMO, Tijuana, Mexico, 865 kc., 215 kw. (Weekly.)

Sundays, 3-5 a.m., TGW, Guatemala City, Guatemala, 560 kc., 10 kw. (Weekly.)

Sundays—4-6 a.m., CKOV, Kelowna, B. C., 630 kc., .1 kw. (Weekly.)

Early Morning Europeans

Official Listening Post Observer Bohm of Sweden provides the following list showing the early morning broadcast periods for a number of the European stations. These are given in E.S.T.

Wilna, 536 kc., 12:45-2 a.m.
Budapest, 545 kc., 12:45-3:45 a.m.
Mühlacker, 574 kc., 12:01-3 a.m.
Riga, 583 kc., 12:01-1 a.m.
Praha, 638 kc., 12:15-3:50 a.m.
Köln, 658 kc., 12:01-2:35 a.m.
Stockholm, 704 kc., 1:20-2 a.m.
Tallinn, 731 kc., 1:01-2 a.m.
München, 740 kc., 12:45-2:40 a.m.
Leipzig, 785 kc., 12:05-3 a.m.
Barcelona, 795 kc., 2:15-4 a.m.
Berlin, 841 kc., 12:15-4 a.m.
Helsingfors, 895 kc., 1:05-2 a.m.
Hamburg, 904 kc., 12:01-2:40 a.m.
Toulouse, 913 kc., 3-4 a.m.
Brünn, 920 kc., 12:15-3:50 a.m.
Breslau, 950 kc., 12:01-3:15 a.m.
Post Parisien, 959 kc., 2-3:45 a.m.
Bratislava, 1004 kc., 12:15-1:30 a.m.
Heilsberg, 1031 kc., 12:01-3:40 a.m.
Copenhagen, 1176 kc., 1-3 a.m.
Frankfurt, 1195 kc., 12:01-4 a.m.

Early Morning Catches

Official Listening Post Observer Kalmbach, Buffalo, New York, lists the following as the best hours (E.S.T.) to tune in

Official RADIO NEWS Broadcast Band Listening Post Observers

Altner, Jacob, Brooklyn, N. Y.
Ansell, Wm. H., Saskatchewan, Canada
Beal, Wm. W., Jr., Lawrence, Mass.
Biss, F. L., Brittmount, Minnesota
Blodgett, Lee F., Creston, Iowa
Bohm, John S., Malung, Sweden
Burleigh, Fred, Meriden, Conn.
Byers, Ernest, Waterloo, Iowa
Caraven, C. R., British Columbia, Canada
Coales, R. T., Hants, England
Dare, Harry A., Pequannock, N. J.
DeMyer, John, Lansing, Michigan
Dixon, Marvin D., Shelby, North Carolina
Dunigan, James A., New Britain, Conn.
Eck, Howard W., E. Lansing, Michigan
Ellis, George N., Stockport, England
Everly, Ray E., Newton, Illinois
Faull, Albert E., Victoria, Australia
Gootee, T. E., Springfield, Missouri
Goss, Edward F., Brooklyn, N. Y.
Halpern, Karl I., Brooklyn, N. Y.
Hausdorff, Dr. Max, Viganello, Switzerland
Hough, Robert, New Rochelle, N. Y.
Hunt, Randolph, Leucadia, Calif.
Hynes, A. L., Clarenville, Newfoundland.
Ingle, George F., New South Wales, Australia
Kalmbach, John C., Jr., Buffalo, New York
Kimmons, E. L., Austin, Texas
Long, C. H., Winston, Missouri
Lyell, A. C., Johannesburg, South Africa
Roberts, E. R., Indianapolis, Indiana
Roberts, Evan B., Danvers, Massachusetts
Robinson, Philip H., Nova Scotia, Canada
Schneider, Jack B., Garwood, New Jersey
Schofield, R. W., Missoula, Montana
Shepherd, R. H., Christchurch, New Zealand
Shields, Donald W., Roseville, Ohio
Southward, Richard J., Toledo, Ohio
Stokes, Joseph, Swissvale, Pennsylvania
Tomlinson, R. H., Port Chester, New York
Walker, Alan B., Princeton, New Jersey
Watson, Eric W., Christchurch, New Zealand
Wilkinson, Henry, Jr., Baltimore, Maryland
Winkley, Warren E., Hughson, California
Woodhead, J. H., Monarch, Wyoming

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certain of the much sought for DX stations:

KDYL, Salt Lake City, Utah, 1290 kc., 2-3 a.m. (Except Sunday.)

WKAQ, San Juan, P. R., 1240 kc., 4 a.m.

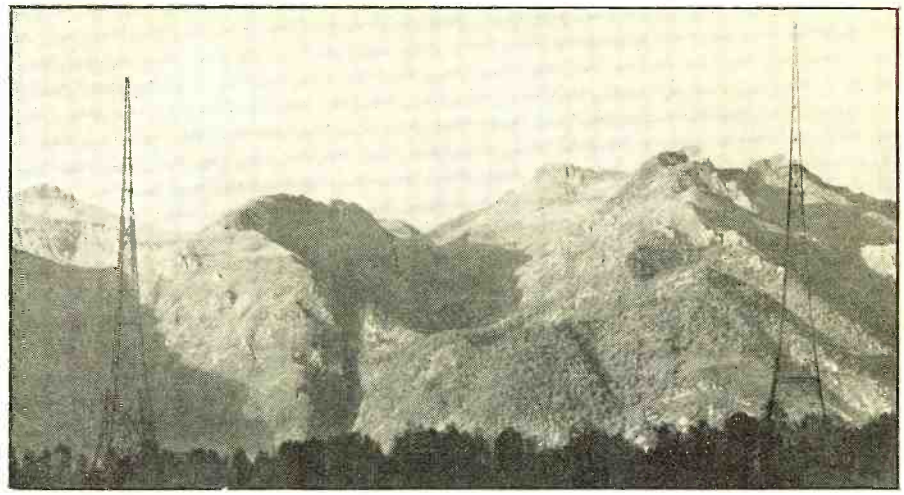
KZRM, Manila, P. I., 618.5 kc., 6 a.m.

KGU, Honolulu, T. H., 750 kc., 5 a.m.

VONF, St. Johns, Newfoundland, 1195 kc., 5 a.m.

Foreign Station Locations

Kc.	Kw.	Call	Location
546	120	Budapest	Hungary
556	100	Beromunster	Switzerland
560	7.5	2CB	Corowa, N. S. W., Aust'l
560	7.5	2CO	Corowa, N. S. W., Aust'l
564	60	Athlone	Irish Free State
565	10	TGW	Guatemala City, Guatemala
570	5	2YA	Wellington, New Zealand
574	100	Stuttgart	Germany
580	1	7ZL	Hobart, Tasm., Aust'l
590	10	JOAK-2	Tokyo, Japan
592	120	Vienna	Austria
601	6.5	Rabat	Morocco
609	20	Florence	Italy
610	10	JODK-1	Keijo, Korea, Japan
610	4.5	3AR	Melbourne, Vict., Aust'l
618.5	50	KZRM	Manila, Philippine Islands
620	.5	4ZP	Invercargill, New Zealand
629	15	Lisbon	Portugal
630	4.5	LS3	Buenos Aires, Argentina
630	.1	CKOV	Kelowna, B. C., Canada
635	7.5	5CK	Crystal Brook, Australia
638	120	Prague	Czechoslovakia
648	15	Lyons	France
650	.5	1YA	Auckland, New Zealand
658	100	Cologne	Germany
658	100	Langenburg	Germany
660	75	XGOA	Nanking, China
665	3.5	2FC	Sydney, N. S. W., Australia
668	50	North Regional	Great Britain
670	10	JFAK	Taihoku, Formosa, Japan
677	25	Sottens	Switzerland
681	1	HJN	Bogota, Colombia
690	3.5	6WF	Perth, W. Austr., Aust'l
695	7	PTT	Paris, France
704	55	Stockholm	Sweden
713	50	1IRO	Rome, Italy
720	2.5	3YA	Christchurch, New Zealand
720	1	JFBK	Tainan, Formosa, Japan
730	2	5CL	Adelaide, Australia
740	100	Munich	Germany
750	2.5	KGU	Honolulu, T. H.
760	2.5	4QG	Brisbane, Qnsld. Aust'l
767	25	Mid. Regional	Great Britain
770	10	JOHK	Sendai, Japan
780	.25	KFQD	Anchorage, Alaska
785	120	Leipzig	Germany
790	8	LR10	Buenos Aires, Argentina
790	.5	4YA	Dunedin, New Zealand
795	5	Barcelona	Spain
800	5	3LO	Melbourne, Vict., Aust'l
804	50	Scottish Reg.	Great Britain
810	10	JOCK-1	Nagoya, Japan
814	50	Milan	Italy
820	.065	2ZH	Napier, New Zealand
830	16	LR5	Buenos Aires, Argentina
830	10	JOIK	Sapporo, Japan
840	.34	CMQ	Havana, Cuba
840	.4	VOGY	St. Johns, Newfoundland
840	.2	2YC	Wellington, N. Z.
841	100	Berlin	Germany
845	2	ZBW	Hong Kong, China
850	1.5	Valencia	Spain
855	3	2BL	Sydney, N.S.W., Aust'l
859	15	Strasbourg	France
870	2.1	LR6	Buenos Aires, Argentina
870	10	JOAK-1	Tokyo, Japan
877	50	London Regional	Great Britain
880	.15	1YX	Auckland, New Zealand
900	10	JODK-2	Keijo, Korea, Japan
900	.5	KGBU	Ketchikan, Alaska
904	100	Hamburg	Germany
910	6	LR2	Buenos Aires, Argentina
910	2	4RK	Rockhampton, Australia
913	60	Toulouse	France
920	1	HHK	Port-au-Prince, Haiti
930	.4	3UZ	Melbourne, Australia
941	10	Goteborg	Sweden
950	17	Breslau	Germany
950	12	LR3	Buenos Aires, Argentina
950	1	2GB	Sydney, N.S.W., Aust'l
959	100	Poste Parisien	France
960	.3	5DN	Adelaide, Australia
960	5	YV1BC	Caracas, Venezuela
960	10	XEAW	Reynosa, Mexico
977	50	West Regional	Great Britain
978	1	XGOD	Hangchow, China
980	.5	JOXK	Tokushima, Japan
985	1	CE9S	Santiago, Chile
990	12	LR4	Buenos Aires, Argentina
995	20	Hilversum	Holland
1000	.05	4GR	Toowoomba, Q'nsl'd., Aust'l
1004	13.5	Bratislava	Czechoslovakia
1010	.3	3HA	Hamilton, Vict., Aust'l
1025	1	2UE	Sydney, N.S.W., Aust'l
1031	60	Konigsberg	Germany
1040	2	5PI	Crystal Brook, Aust'l
1050	50	Scottish Nat'l	Great Britain
1059	20	Bari	Italy
1077	12	Bordeaux	France
1085	10	JOBK-2	Osaka, Japan
1120	.1	CHSJ	St. John, New Brunswick
1125	1	2UW	Sydney, N.S.W., Australia
1131	10	Horby	Sweden
1140	7	Turin	Italy
1145	.75	4BC	Brisbane, Q'nsl'd., Aust'l
1150	5	LR8	Buenos Aires, Argentina
1175	10	JOCK-2	Nagoya, Japan
1176	10	Copenhagen	Denmark
1180	.4	3DB	Melbourne, Australia
1190	.01	VE9EK	Montmagny, Que., Can.
1190 / 1195	5	LS2	Buenos Aires, Argentina
1195	17	Frankfurt	Germany
1210	1	2CH	Sydney, N.S.W., Australia
1222	10	Trieste	Italy
1240	1	WKAQ	San Juan, Puerto Rico
1245	2	2NC	New Castle, N.S.W. Aust'l
1258	3	San Sebastian	Spain
1267	2	Nurnburg	Germany
1270	1	2SM	Sydney, N.S.W., Aust'l
1320	.25	KGMB	Honolulu, T. H.
1456	10	Fecamp	France
1456	10	Radio Normandie	France
1474	1	Bournemouth	Great Britain



Courtesy R. H. Tomlinson

MONTE CENERI, SWITZERLAND

Dwarfed by the mountains and forest, these are the towers of this Swiss station which operates on 1167 kc., with 15 kw. power. Programs are mostly in Italian.

OFFICIAL R. N. LISTENING POST IN SWITZERLAND

The home and research laboratory of Dr. Max Hausdorff, Official Radio News Observer for both the Short-wave and Broadcast-band DX Corners. His own Swiss Amateur transmitting station, HB9RBX, is also located here.

The RADIO NEWS Tenatuner

O. Swanson, Spokane, Washington, sends in an interesting comment:

"I have just completed the antenna tuning unit described in the February, 1934, issue of RADIO NEWS, page 483. I am using a 50-foot vertical wire for an antenna and the 'Tenatuner' actually increases the signal pick-up 1 or 20 times! Its effectiveness is unbelievable. Why didn't somebody think of this before?

"I also find it a big help on short waves. I have a short-wave converter with regenerative detector. I tune the antenna by means of the 'Tenatuner' so that one of its harmonics falls all the frequency of the station I want. The receiver then slides in and out of oscillation with extreme smoothness."

The "Tenatuner" does, in many cases, actually produce remarkable improvement in signal strength on the broadcast band. With the majority of receivers, however, it has not been found useful on the short waves. Apparently with a simple regenerative type of receiver, though, Mr. Swanson has found it highly effective even there.

F. C. C. Monitor Schedules

It has recently been reported that the monitor schedules, which have been so helpful to DX fans in logging low-power distant stations during the first week of each month, are to be discontinued. The Federal Communications Commission is reported to have under construction a group of six frequency-monitoring trucks to be distributed around the United States for the purpose of checking the frequencies of broadcast stations during regular operating hours. Each of these trucks will travel continuously through the district to which it is assigned. This will eliminate the necessity for the long-distance checks which have been made in the past. While this is unfortunate from the standpoint of the DX listener, it represents a considerable saving to the smaller broadcast stations which have had to go on the air with a special early-morning program in the past.

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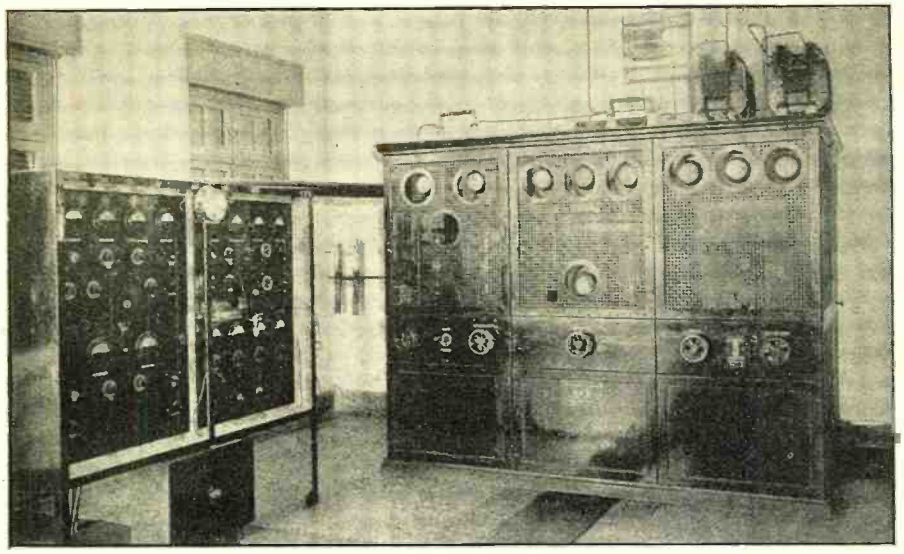

RABAT, MOROCCO

Although not as well known in America as its short-wave sister station, "Radio Rabat," 601 kc., is sometimes heard on this side of the Atlantic. This photo shows the 6 kw. transmitter.

Definite information does not seem to be available as to when this change will be made, but DX fans who are interested in running up big United States logs had better get busy and take fullest advantage of the present monitor schedules.

Consolidated Foreign "Best Bets"

The Official Listening Post Observers in several states submitted especially comprehensive reports on foreign DX reception this month. As a matter of convenience to readers, these reports are being grouped together in one tabulation in the order of frequencies.

This list is based on actual reception indicated in reports received. The asterisks in Column 1 indicate stations heard in New York and New Jersey as reported by Official L.P.O.'s Tomlinson, Goss, Hough, Schneider, and Altner. Column 2 shows stations reported by Evan B. Roberts for the State of Massachusetts. Column 3 includes reports from Michigan and Ohio submitted by Observers Eck, Shields, and Southward. Column 4 includes Newfoundland and Nova Scotia, reported by Observers P. H. Robinson and A. L. Hynes. Column 5 includes Montana and Wyoming, from reports submitted by Observers Schofield and Woodhead. In passing, it is interesting to note that Observers Schofield, Roberts and Tomlinson each reported between forty and fifty foreign stations heard during the month.

The country, power, etc., of the stations shown in this list can be ascertained by referring to the consolidated foreign call list shown elsewhere in this department.

In general, the best European reception is obtained from midnight to 3 a.m. and from 4:30 to 7:30 p.m. South Americans are reported from about 6 p.m. to midnight and the transpacific stations from 4 to about 7:30 a.m. All hours are E.S.T.

KC	Call	1	2	3	4	5
546	Budapest	*	*	–	–	–
556	Beromunster	–	*	–	–	–
560	2CB	–	–	*	–	–
560	2CO	–	–	*	–	*
564	Athlone	–	*	–	*	–
565	TGW	*	–	*	–	*
570	2YA	*	–	*	–	*
574	Stuttgart	*	*	–	*	–
580	7ZL	–	–	–	–	*
590	JOAK-2	–	*	–	–	–
592	Vienna	*	–	–	–	–
601	Rabat	–	–	–	*	–
609	Florence	–	–	–	*	–
618.5	KZRM	–	–	–	–	*
610	JODK-1	–	–	–	–	*
610	3AR	–	–	*	–	*
620	4ZP	–	–	–	–	*
629	Lisbon	–	*	–	*	–
630	LS3	*	–	–	–	–
630	CKOV	–	–	*	–	–
635	5CK	*	–	*	–	*
638	Prague	*	*	–	–	–
648	Lyons	–	*	–	*	–
650	1YA	–	–	–	–	*
658	Cologne	*	*	–	–	–
658	Langenburg	–	–	*	–	–
660	XGOA	–	–	–	–	*
665	2FC	*	–	–	–	*
668	North Regional	–	*	–	–	–
670	JFAK	–	–	–	–	*
677	Sottens	–	*	–	–	–
681	HJN	*	–	–	–	–
690	6WF	–	–	–	–	*
695	PTT	–	*	–	–	–
704	Stockholm	–	*	–	–	–
713	11RO	*	*	–	*	–
720	3YA	–	–	*	–	*
720	JFBK	–	–	–	–	*
730	5CL	–	–	–	–	*
740	Munich	*	*	–	–	–
750	KGU	–	–	*	–	*
760	4QG	*	–	*	–	*
767	Midland Regional	–	*	–	–	–
770	JOHK	–	*	–	–	*
780	KFQD	–	–	–	–	*
785	Leipzig	*	*	–	*	–
790	LR10	*	–	–	–	–
790	4YA	–	–	–	–	*
795	Barcelona	*	*	–	–	–
800	3LO	*	–	*	–	*
804	Scottish Regional	*	*	–	*	–
810	JOCK-1	–	*	–	–	–
814	Milan	*	*	–	*	–
820	2ZH	–	–	–	–	*
830	LR5	*	–	–	–	*
830	JOIK	–	–	–	–	*
840	CMQ	–	–	–	–	*
840	VOGY	–	–	–	–	*
840	2YC	–	–	–	–	*
841	Berlin	*	*	*	*	–
845	ZBW	–	–	–	–	*
850	Valencia	–	*	–	–	–
855	2BL	*	–	*	–	*
859	Strasbourg	–	–	*	–	–
870	JOAK-1	–	*	–	–	–
870	LR6	*	–	–	–	–
877	London Regional	–	*	–	–	–
880	1YX	–	–	–	–	*
900	JODK-2	–	–	–	–	*
900	KGBU	–	–	–	–	*
904	Hamburg	*	–	–	*	–
910	IR2	*	–	–	–	–
910	4RK	*	–	–	–	*
913	Toulouse	*	*	–	*	–
920	HHK	*	–	–	–	–
930	3UZ	–	–	–	–	*
941	Goteborg	–	*	–	–	–
950	Breslau	*	–	–	–	–
950	LR3	*	–	–	–	–
950	2GB	*	–	–	–	*
959	Poste Parisien	*	*	*	–	–
960	5DN	–	–	–	–	*
960	XEAW	–	–	–	–	*
960	YV1BC	*	*	*	–	–
977	West Regional	*	*	–	–	–
978	XGOD	–	–	–	–	*
985	CE98	*	–	–	–	–
990	LR4	*	–	–	–	–
995	Hilversum	*	–	–	–	–
1000	4GR	*	–	–	–	*
1004	Bratislava	*	–	–	–	–
1010	3HA	–	–	–	–	*
1025	2UE	*	–	–	–	*
1031	Konigsberg	*	*	–	–	–
1040	5PI	–	–	–	–	*
1050	Scottish National	–	–	–	*	–
1059	Bari	*	–	–	–	–
1077	Bordeaux	–	*	–	*	–
1085	JOBK-2	–	*	–	–	–
1120	CHSJ	–	–	*	–	–
1125	2UW	–	–	–	–	*
1131	Horby	–	*	–	*	–
1140	Turin	*	*	–	*	–
1145	4BC	*	–	*	–	*
1150	LR8	–	–	*	–	–
1175	JOCK-2	–	*	–	–	–
1176	Copenhagen	*	*	–	–	–
1180	3DB	–	–	–	–	*
1190	VE9EK	*	–	*	*	–
1190 1195	LS2	*	–	*	–	–
1195	Frankfurt	*	*	*	*	–
1210	2CH	–	–	–	–	*
1222	Trieste	–	*	–	*	–
1240	WKAQ	–	–	–	–	*
1245	2NC	–	–	–	–	*
1258	San Sebastian	–	–	–	*	–
1267	Nurnburg	–	–	*	–	–
1270	2SM	–	–	–	–	*
1320	KGMB	–	–	–	–	*
1456	Fecamp	*	*	–	–	–
1456	Radio-Normandie	*	–	*	*	–
1474	Bournemouth	–	–	–	*	–

Reports from California

OBSERVER WINKLEY: "I have heard the Japs lately and they, as well as other T.P. stations, are very strong. TGW was received here very well on their last broadcasts. LR5 was QSA4-R7 on their recent DX program."

OBSERVER HUNT: "Listened to the entire program from 4BC, Brisbane, on November 11th from 2:30-4:30 a.m., P.S.T. This broadcast, dedicated to the listeners of Canada and the United States, was without doubt the best array of speakers and artists I ever heard on any DX program. The reception could be rated at 90% at this point.

"After the 4BC DX, a bit of fussing with the dials, and at 5 a.m., P.S.T., KZRM was picked up and held until 5:30 a.m., their signals being QSA4-R7-8.

"Other than these, all my DX'ing has been confined to the JO's from 4:30 a.m., P.S.T. The calls of nineteen stations in Japan and Korea that reports have been sent to, came between 4:34-4:53 a.m., P.S.T. The signals of the JO's are about the same as last season, but the signals from the stations in the United States using C.S.T. and E.S.T. are much stronger and are received here long after it is daylight in the Middle West and East, which does not add to the ease of holding JO's until they sign off. As an example, on Nov. 14th I caught JOXK off the 'chain' and was just starting to get some material for verification when KDKA on the same frequency upset my plans about 7:15 a.m., E.S.T., and continued to do so for about fifteen minutes before fading out; JOXK did the same.

"Nearly overlooked the old reliable XGOA at Nanking; they are heard every morning until after daylight.

"Local reception is poor this season because all U. S. station signals are so strong that the reception of all programs from Pacific Coast stations not having cleared channels is more or less ruined by a station in the background. Have even heard WGY not doing KGO any good."

Report from New Jersey

Official L.P.O. Schneider reported as follows, on November 11: "Since a report of mine was published in R. N. last May I have added 47 stations, to make a total of heard stations 827, with approximately 700 verified. Those I consider of major importance are: XEBC, XEMO, XEAL, KUMA, Ariz.; KGAR, Ariz.; KRE, Calif.; KPQ, Wash.; KGMB, Honolulu; and TGW, Central America, which comes through every Sunday morning 2-5 E.S.T., with great consistency. The frequency is 565 kc., and power, 10 kw. Other good DX catches are: KLUF, KICA, KGFL, KWTN, VOGY (840 kc., 400 w.), VE9EK (1195 kc., 10 w.), W2XR (1530 kc., 350 w.), and W1XBS (1550 kc., 1000 w.).

"I had expected to run my log over the 830 mark this morning, but gave up after

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about 15 minutes at the dials, as the noise level was far above signal strength."

Then on November 19th he sent in a follow-up report: "I thought I could succeed in passing the 830 mark of my log before my first report as L.P.O. for N. J. appeared in the DX Corner for B.C.B., and I have succeeded. At 11:30 p.m., E.S.T., I tuned in a 15-minute program of piano solos from CJRM, 540 kc. Some hours later I heard CHSJ, 1120 kc., with an informal DX dedication to the Newark News Radio Club. This was my 830th DX catch. CFCY, 630 kc., 500 w., was number 831.

"This a.m. I pulled in CJKL, after battling WEXL, on 1310 kc., to make my log 832. Poste Parisien also came through this morning, between 2 and 2:30 a.m., with phonograph records."

Report from Connecticut

"Transatlantic reception seems to be the outstanding feature for this district at the present time. Post Parisien, Toulouse and West Regional are being heard quite consistently, from the time it starts to get dark until around 7 p.m., E.S.T. For those who are still trying for their first Transatlantic station, I would suggest they concentrate on Poste Parisien, 959 kc. At times I have heard this station with R9 volume, probably due to the fact that it has a clear channel as far as this district is concerned.

"YV1RC, Caracas, Venezuela, on 960 kc., is the best South American and may be heard nearly any evening as soon as Poste Parisien starts to drop out or from 7-7:30 p.m., E.S.T., when XEAW, Reynosa, Mexico, puts in an appearance.

"Transpacific reception hasn't been so good the past few weeks."

—OBSERVER BURLEIGH.

Reports from North Carolina

"First I want to say I believe that November has been the worst month for DX work I have ever seen. I have not been able to hear one foreign station since the 3rd of this month, with the exception of TGW and LR5. However, the last of October and up to the 3rd of November proved to be quite good for reception on the broadcast band.

"From Oct. 25th to Nov. 3rd, the following stations were heard: (All time given as E.S.T.)

2CO	Corowa, Ausl.	560 kc.	4:40-6:00 a.m. F
2YA	Wellington, N. Z.	570 kc.	4:30-6:10 a.m. G
5CK	Crystal Brook, Ausl.	635 kc.	5:15-5:45 a.m. P
4QG	Brisbane, Ausl.	760 kc.	5:00-5:45 a.m. F
2BL	Sydney, Ausl.	855 kc.	4:30-6:30 a.m. VG
2UE	Sydney, Ausl.	1025 kc.	4:45-5:30 a.m. G
4BC	Brisbane, Ausl.	1145 kc.	4:30-6:00 a.m. VG

(P is poor, G is good, F is fair, VG is very good.)

"TGW is heard here every Sunday morning very well, on 565 kc., from 2-6 a.m., with a special DX program for North America.

"LR5 was heard here quite well on their special DX program November 4, from 2-3 a.m. This was a special DX program for the NNRC Radio Club. (830 kc.)"

—OBSERVER DIXON.

Report from Texas

"Following are the new stations logged by this Listening Post from October 1 to November 10: (C.S.T.)

KWTO	— 560 kc.—Springfield, Mo., 1:09-1:33 a.m.
CMCA	—1230 kc.—Havana, Cuba, 1:19-2:10 a.m.
XEMO	— 865 kc.—TiJuana, B.C. Mexico, 2-3 a.m.
TGW	— 560 kc.—Guatemala City, Guatemala, Central America, 3:29-4:03 a.m.
WALA	—1380 kc.—Mobile, Ala., 2:26-2:52 a.m.
KOTN	—1500 kc.—Pine Bluff, Ark., 2:11-2:27 a.m.
CJGX	— 630 kc.—Yorkton, Sask., Canada, 2:09-3:01 a.m.
LRS	— 830 kc.—Buenos Aires, Argentine, 1:05-2:05 a.m.
WCHS	— 580 kc.—Charleston, W. Va., 1:21-1:40 a.m.
WJAR	— 890 kc.—Providence, R. I., 1:52-2:16 a.m.
KBTM	— 1200 kc.—Jonesboro, Ark., 2:55-3:10 a.m.

"This State is still very dry, the static being much worse than the previous month."

—OBSERVER KIMMONS.

Report from Missouri

"The weather here in southern Missouri has been such during October and November that DX conditions were poor. As a result, my reception report is rather brief.

"On the morning of October 31st I picked up XGOA, Nanking, China, 660 kc., and held him from 4:40-5:15 a.m., C.S.T.

"On November 3rd I heard TGX, 1400 kc., on one of his regular DX broadcasts, midnight to 2 a.m.

"TGW, 565 kc., Guatemala, was received R7-8, during several of their regular Sunday morning broadcasts.

"Shortly after WBZ signs off on 990 kc., Friday nights, I heard another station which shuts down two or three minutes later by playing a bugle call. I think this may be LR4, but I am not certain. Can any Eastern reader help me out?"

—OBSERVER GOOTEE.

Foreign Readers, Attention

In many countries outside of the United States RADIO NEWS has found it difficult to learn the name of the government bureau or agent from which definite and accurate information concerning broadcast stations can be obtained. If you, as a foreign reader of this department, can supply the name and address of the proper Official or Bureau in your country, it will materially aid the Editor in obtaining and presenting complete foreign information in this department.

Report from Sweden

"October was not very good for reception of U. S. stations. Only during the first part of the month were stations from the U. S. audible. From October 6th to 11th I heard lots of west coast stations and nearly all the 500-1000 watt transmitters located in the east part of the States.

"The morning of November 7 I had wonderful reception from U. S. stations. I could identify a station on every channel from 1480-590 kc. The best station was KOA, 830 kc., Denver. I find this curious, as this station is located so far west in the States. However, KOA was much better than WCAU, WTIC, WPG, etc. The signals were strongest between 1:30 and 3:30, M.E.T."

—OBSERVER BOHM.

MODERNIZED MANCHURIA

Miss Lui, one of the favorite radio stars who broadcasts regularly over the Manchurian station at Hsinking. This station is operated jointly by Manchoukuo and Japanese interests.

Report from Switzerland

Official L.P.O. Hausdorff reports that at his mountain home, a photograph of which appears in this department this month, he has been able to receive a number of U. S. stations regularly, "with loudspeaker volume as on locals." The U. S. stations which he reports as offering the best reception are: KGMB, 1320 kc., 250 w., Hawaii; WCAU, 1170 kc., 50 kw., Philadelphia; KFOX, 1250 kc., 1 kw., California; WBNX, 1350 kc., 250 w., New York; and KDKA, 980 kc., 50 kw., Pittsburgh.

Report from England

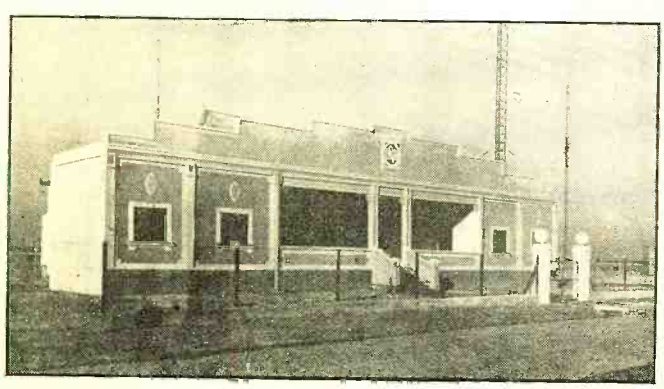
"October is about the start of the DX season here, and one can hardly expect reception to be as reliable as later on. This October, however, has proved very poor indeed for reception of U. S. stations; there was just one splendid night, that of the 11th, or the evening of the 10th with you. The following stations were heard between 11:40 p.m., G.M.T., October 10, and 5:35 a.m., October 11, conditions being nearly as good as best winter DX:

Call		*Kc.*	*Time*	
WSMB	New Orleans	1320	4:57	Good
XEAW	Mexico	950	4:40	Fair
WFBL	Syracuse	1360	4:12	Fair
WNEW	Newark	1250	3:25	Good
WFEA	Manchester	1340	2:50	Good
WBBC	Brooklyn	1400	2:29	Fair
WWL	New Orleans	850	2:05	Weak
WJZ	New York	760	1:35	Good
WHN	New York	1010	12:26	Fair
WBZ	Boston	990	12:10	V. Good
VONF	Newfoundland	950	12:03	V. Good
WBT	Charlotte	1080	11:40	Good
WHAS	Louisville	820	5:20	Good
WLW	Cincinnati	700	5:35	V. Good

"U. S. stations are heard beginning about an hour before midnight provided the local (European) station on that wave has

(*Continued on page* 513)

Photos courtesy R. H. Tomlinson



RADIO EXCELSIOR, BUENOS AIRES

This station, LR5, operating on 830 kc., with 25 kw. power, is commonly heard in North America. Special broadcasts to North America are scheduled for January 6 and February 3 from 2:05-3:05 a.m., E.S.T.

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BROADCASTING STATIONS IN THE U. S.

Alphabetically by Call Letters, Location, Frequency and Power

Compiled by John M. Borst

Call	Location	Kc.	Kw.
KABC	San Antonio, Texas	1420	.1
KADA	Ada, Okla. (C. P.)	1200	.1
KALE	Portland, Ore.	1300	.5
KARK	Little Rock, Ark.	890	.25-.5
KASA	Elk City, Okla.	1210	.1
KBPS	Portland, Ore.	1420	.1
KBTM	Paragould, Ark. (C.P. to move to Jonesboro)	1200	.1
KCMC	Texarkana, Ark.	1420	.1
KCRC	Enid, Okla.	1370	.1-.25
KCRJ	Jerome, Ariz.	1310	.1
KDB	Santa Barbara, Calif.	1500	.1
KDFN	Casper, Wyo.	1440	.5
KDKA	Pittsburgh	980	50
KDLR	Devils Lake, N. Dak.	1210	.1
KDYL	Salt Lake City, Utah	1290	1
KECA	Los Angeles, Calif. (C.P. 2.5 kw-day)	1430	1
KELW	Burbank, Calif.	780	.5
KERN	Bakersfield, Calif.	1370	.1
KEX	Portland, Ore.	1180	5
KFAB	Lincoln, Nebr.	770	5
KFAC	Los Angeles, Calif.	1300	1
KFBB	Great Falls, Montana	1280	1-2.5
KFBI	Abilene, Kansas	1050	5
KFBK	Sacramento, Calif.	1310	.1
KFDM	Beaumont, Texas	560	.5-1
KFDY	Brookings, South Dak.	780	1
KFEL	Denver, Colo.	920	.5
KFEQ	St. Joseph, Mo.	680	2.5
KFGQ	Boone, Iowa	1370	.1
KFH	Wichita, Kansas	1300	1
KFI	Los Angeles, Calif.	640	50
KFIO	Spokane, Wash.	1120	.1
KFIZ	Fond du Lac, Wis.	1420	.1
KFJB	Marshalltown, Iowa	1200	.1-.25
KFJI	Klamath Falls, Ore.	1210	.1
KFJM	Grand Forks, N. Dak.	1370	.1
KFJR	Portland, Ore.	1300	.5
KFJZ	Fort Worth, Texas	1370	.1
KFKA	Greeley, Colo.	880	.5-1
KFKU	Lawrence, Kansas	1220	1
KFNF	Shenandoah, Iowa	890	.5-1
KFOR	Lincoln, Nebr.	1210	.1-.25
KFOX	Long Beach, Calif.	1250	1
KFPL	Dublin, Texas	1310	.1
KFPM	Greenville, Texas	1310	.015
KFPW	Ft. Smith, Ark.	1210	.1
KFPY	Spokane, Wash.	1340	1
KFQD	Anchorage, Alaska	780	.25
KFRC	San Francisco, Calif. (C.P. 2.5 kw-day)	610	1
KFRU	Columbia, Mo.	630	.5
KFSD	San Diego, Calif.	600	1
KFSG	Los Angeles, Calif.	1120	.5
KFUO	Clayton, Mo.	550	.5-1
KFVD	Los Angeles, Calif.	1000	.25
KFVS	Cape Girardeau, Mo. (C.P. .25 kw-day)	1210	.1
KFWB	Hollywood, Calif. (C.P. 2.5kw-day)	950	1
KFXD	Nampa, Idaho	1200	.1
KFXJ	Grand Junction, Colo.	1200	.1
KFXM	San Bernardino, Calif.	1210	.1
KFXR	Oklahoma City, Okla.	1310	.1-.25
KFYO	Lubbock, Texas	1310	.1-.25
KFYR	Bismarck, N. Dakota	550	1-2.5
KGA	Spokane, Wash.	1470	5
KGAR	Tucson, Ariz.	1370	.1-.25
KGB	San Diego, Calif. (C.P. 2.5 kw-day)	1330	1
KGBU	Ketchikan, Alaska	900	.5
KGBX	Springfield, Mo.	1230	.5
KGBZ	York, Nebr.	930	1-2.5
KGCA	Decorah, Iowa	1270	.1
KGCU	Mandan, N. Dakota	1240	.25
KGCX	Wolf Point, Montana	1310	.1-.25
KGDE	Fergus Falls, Minn.	1200	.1-.25
KGDM	Stockton, Calif.	1100	.25
KGDY	Huron, S. Dak.	1340	.25
KGEK	Yuma, Colo. (C.P. to move to Sterling)	1200	.1
KGER	Long Beach, Calif.	1360	1
KGEZ	Kalispell, Mont.	1310	.1
KGFF	Shawnee, Okla.	1420	.1
KGFG	Oklahoma City, Okla.	1370	.1
KGFI	Corpus Christi, Texas	1500	.1-.25
KGFJ	Los Angeles, Calif.	1200	.1
KGFK	Moorhead, Minn.	1500	.1
KGFL	Roswell, N. Mex.	1370	.1
KGFW	Kearney, Nebr.	1310	.1
KGFX	Pierre, S. Dak.	630	.2
KGGC	San Francisco, Calif.	1420	.1
KGGF	Coffeyville, Kansas	1010	1
KGGM	Albuquerque, N. Mex.	1230	.25-.5
KGHF	Pueblo, Colo. (C.P. .5 kw full time)	1320	.25
KGHI	Little Rock, Ark.	1200	.1-.25
KGHL	Billings, Mont.	950	1-2.5
KGIR	Butte, Mont. (C.P. 2.5 kw-day)	1360	1
KGIW	Alamosa, Colo.	1420	.1
KGIX	Las Vegas, Nev.	1420	.1
KGKB	Tyler, Texas	1500	.1
KGKL	San Angelo, Texas	1370	.1-.25
KGKO	Wichita Falls, Texas	570	.25-1
KGKY	Scottsbluff, Nebraska	1500	.1
KGMB	Honolulu, Hawaii	1320	.24
KGNF	North Platte, Nebr.	1430	.5-1
KGNO	Dodge City, Kansas	1340	.25
KGO	San Francisco	790	7.5
KGRS	Amarillo, Texas (C.P. 2.5 kw-day)	1410	1
KGU	Honolulu, Hawaii	750	2.5
KGVO	Missoula, Mont.	1200	.1
KGW	Portland, Ore. (C.P. 2.5 kw-day)	620	1
KGY	Olympia, Wash.	1210	.1
KHJ	Los Angeles, Calif. (C.P. 2.5 kw-day)	900	1
KHQ	Spokane, Wash.	590	1-2
KICA	Clovis, N. Mex.	1370	.1
KICK	Carter Lake, Iowa (To be replaced by WOC)	1420	.1
KID	Idaho Falls, Idaho	1320	.25-.5
KIDO	Boise, Idaho (C.P. 2.5 kw-day)	1350	1
KIDW	Lamar, Colo.	1420	.1
KIEM	Eureka, Calif.	1210	.1
KIEV	Glendale, Calif. (C.P. .25 kw)	850	.1
KIT	Yakima, Wash.	1310	.1
KJBS	San Francisco, Calif. (C.P. .5 kw.)	1070	.1
KJR	Seattle, Wash.	970	5
KLCN	Blytheville, Ark.	1290	.1
KLO	Ogden, Utah	1400	.5
KLPM	Minot, N. Dakota	1240	.25
KLRA	Little Rock' Ark.	1390	1-2.5
KLS	Oakland, Calif.	1440	.25
KLUF	Galveston, Texas	1370	.1
KLX	Oakland, Calif.	880	1
KLZ	Denver, Colo. (C.P. 2.5 kw-day)	560	1
KMA	Shenandoah, Iowa	930	1-2.5
KMAC	San Antonio, Texas	1370	.1
KMBC	Kansas City, Mo. (C.P. 2.5 kw-day)	950	1
KMED	Medford, Ore. (C.P. .25 kw-day)	1310	.1
KMJ	Fresno, Calif.	580	.5
KMLB	Monroe, La.	1200	.1
KMMJ	Clay Center, Nebr.	740	1
KMO	Tacoma, Wash.	1330	.25
KMOX	St. Louis, Mo.	1090	50
KMPC	Beverly Hills, Calif.	710	.5
KMTR	Los Angeles, Calif.	570	1
KNOW	Austin, Texas	1500	.1
KNX	Los Angeles, Calif.	1050	50
KOA	Denver, Colo.	830	50
KOAC	Corvallis, Ore.	550	1
KOB	Albuquerque, N. Mex.	1180	10
KOH	Reno, Nev.	1380	.5
KOIL	Council Bluffs, Iowa (C.P. 2.5 kw-day)	1260	1
KOIN	Portland, Ore. (C.P. 2.5 kw-day)	940	1
KOL	Seattle, Wash. (C.P. 2.5 kw-day)	1270	1
KOMA	Oklahoma City, Okla.	1480	5
KOMO	Seattle, Wash.	920	1
KONO	San Antonio, Texas	1370	.1
KOOS	Marshfield, Ore.	1200	.1
KORE	Eugene, Ore.	1420	.1
KOTN	Pine Bluff, Ark.	1500	.1
KOY	Phoenix, Ariz.	1390	.5-1
KPAC	Brownsville, Texas (C.P. Port Arthur)	1260	.5
KPCB	Seattle, Wash. (C.P. .25 kw.)	650	.1
KPJM	Prescott, Ariz.	1500	.1
KPO	San Francisco, Calif.	680	50
KPOF	Denver, Colo.	880	.5
KPPC	Pasadena, Calif.	1210	.05
KPQ	Wenatchee, Wash.	1500	.1
KPRC	Houston, Texas	920	1-5
KQV	Pittsburgh, Pa.	1380	.5
KQW	San Jose, Calif. (C.P. 1 kw.)	1010	.5
KRE	Berkeley, Calif.	1370	.1
KREG	Santa Ana, Calif.	1500	.1
KRGV	Weslaco, Texas	1260	.5
KRKD	Los Angeles, Calif.	1120	.5-2.5
KRKO	Everett, Wash.	1370	.05
KRLD	Dallas, Texas	1940	10
KRMD	Shreveport, La.	1310	.1
KROW	Oakland, Calif.	930	1
KRSC	Seattle, Wash.	1120	.1
KSAC	Manhattan, Kan.	580	.5-1
KSCJ	Sioux City, Iowa	1330	1-2.5
KSD	St. Louis, Mo. (C.P. 2.5 kw-day)	550	.5-1
KSEI	Pocatello, Idaho	890	.25-
KSL	Salt Lake City, Utah	1130	50
KSLM	Salem, Ore.	1370	.1
KSO	Des Moines, Iowa	1320	.5
KSOO	Sioux Falls, S. Dakota	1110	2.5
KSTP	St. Paul, Minn.	1460	10
KSUN	Lowell, Ariz.	1200	.1
KTAB	San Francisco, Calif.	560	1
KTAR	Phoenix, Ariz.	620	.5-1
KTAT	Fort Worth, Texas	1240	1
KTBS	Shreveport, La.	1450	1
KTFI	West Twin Falls, Idaho	1240	.5-1
KTHS	Hot Springs, National Park, Ark.	1040	10
KTM	Los Angeles, Calif.	780	.5-1
KTRB	Modesto, Calif.	740	.25
KTRH	Houston, Texas	1330	1-2.5
KTSA	San Antonio, Texas	1290	1-2.5
KTSM	El Paso, Texas	1310	.1
KTUL	Tulsa, Okla.	1400	.25-.5
KTW	Seattle, Wash.	1220	1
KUJ	Walla Walla, Wash.	1370	.1
KUMA	Yuma, Ariz.	1420	.1
KUOA	Fayetteville, Ark.	1260	1
KUSD	Vermillion, S. D.	890	.5
KVI	Tacoma, Wash.	570	1
KVL	Seattle, Wash.	1370	.1
KVOA	Tucson, Ariz.	1260	.5
KVOD	Denver, Colo.	920	.5
KVOO	Tulsa, Okla.	1140	25
KVOR	Colorado Springs, Colo.	1270	1
KVOS	Bellingham, Wash.	1200	.1
KWCR	Cedar Rapids, Iowa	1430	.25-.5
KWEA	Shreveport, La.	1210	.1
KWFV	S. Hilo, Waiakea, Hawaii (C.P.)	1210	.1
KWG	Stockton, Calif.	1200	.1
KWJJ	Portland, Ore.	1060	.5
KWK	St. Louis, Mo. (C.P. 2.5 kw-day)	1350	1
KWKC	Kansas City, Mo.	1370	.1
KWKH	Shreveport, La.	850	10
KWLC	Decorah, Iowa	1270	.1
KWSC	Pullman, Wash.	1220	1-2
KWTN	Watertown, S. Dak.	1210	.1
KWTO	Springfield, Mo.	560	1
KWYO	Sheridan, Wyo.	1370	.1
KXA	Seattle, Wash.	760	.25-.5
KXL	Portland, Ore.	1420	.25
KXO	El Centro, Calif.	1500	.1
KXRO	Aberdeen, Wash.	1310	.1
KXYZ	Houston, Texas	1440	.25
KYA	San Francisco, Calif.	1230	1
KYW	Philadelphia, Pa.	1020	10
WAAB	Boston, Mass.	1410	.5
WAAF	Chicago, Ill.	920	.5
WAAT	Jersey City, N. J.	940	.5
WAAW	Omaha, Nebr.	660	.5
WABC	New York, N. Y.	860	50
WABI	Bangor, Maine	1200	.1
WACO	Waco, Texas	1420	.1
WADC	Tallmadge, Ohio (C.P. 2.5 kw-day)	1320	1
WAGF	Dothan, Ala.	1370	.1
WAGM	Presque Isle, Maine	1420	.1
WAIU	Columbus, Ohio	640	.5
WALA	Mobile, Ala.	1380	.5-1
WALR	Zanesville, Ohio	1210	.1
WAMC	Anniston, Ala. (C.P.)	1420	.1
WAML	Laurel, Miss.	1310	.1
WAPI	Birmingham, Ala.	1140	5
WARD	Brooklyn, N. Y.	1400	.5
WASH	Grand Rapids	1270	.5
WATR	Waterbury, Conn.	1190	.1
WAVE	Louisville, Ky.	940	1
WAWZ	Zarephath, N. J.	1350	.25
WAZL	Hazleton, Penna.	1420	.1
WBAA	West Lafayette, Ind.	890	1
WBAL	Baltimore, Md.	1060	10
WBAP	Fort Worth, Texas	800	50
WBAX	Wilkes-Barre, Penna.	1210	.1
WBBC	Brooklyn, N. Y.	1400	.5
WBBL	Richmond, Va.	1210	.1
WBBM	Chicago, Ill.	770	25
WBBR	Brooklyn, N. Y.	1300	1
WBBZ	Ponca City, Okla.	1200	.1
WBCM	Bay City, Mich.	1410	.5
WBEN	Buffalo, N. Y.	900	1
WBEO	Marquette, Mich.	1310	.1
WBHS	Huntsville, Ala.	1200	.1
WBIG	Greensboro, N. C.	1440	.5-1
WBNO	New Orleans, La.	1200	.1
WBNS	Columbus, Ohio	1430	.5-1
WBNX	New York, N. Y.	1350	.25
WBOQ	(See WABC)		
WBOW	Terre Haute, Ind.	1310	.1
WBRB	Red Bank, N. J.	1210	.1
WBRC	Birmingham, Ala.	930	1
WBRE	Wilkes-Barre, Pa.	1310	.1
WBSP	Needham, Mass.	920	.5
WBT	Charlotte, N. C.	1080	50
WBTM	Danville, Va.	1370	.1
WBZ	Boston, Mass.	990	50
WBZA	Boston, Mass.	990	1
WCAC	Storrs, Conn.	600	.5
WCAD	Canton, N. Y.	1220	.5
WCAE	Pittsburgh, Pa.	1220	1
WCAL	Northfield, Minn.	1250	2.5

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WCAM	Camden, N. J.	1280	.5
WCAO	Baltimore, Md.	600	.5-1
WCAP	Asbury Park, N. J.	1280	.5
WCAT	Rapid City, S. Dak.	1200	.1
WCAU	Philadelphia, Pa.	1170	50
WCAX	Burlington, Vt.	1200	.1
WCAZ	Carthage, Ill.	1070	.1
WCBA	Allentown, Penna.	1440	.25
WCBD	Zion, Ill.	1080	5
WCBM	Baltimore, Md.	1370	.1-.25
WCBS	Springfield, Ill.	1210	.1
WCCO	Minneapolis, Minn.	810	50
WCFL	Chicago, Ill.	970	1.5
WCHS	Charleston, W. Va.	580	.5-1
WCKY	Covington, Ky.	1490	5
WCLO	Janesville, Wis.	1200	.1
WCLS	Joliet, Ill.	1310	.1
WCNW	Brooklyn, N. Y. (C.P. .25 kw-day)	1500	.1
WCOA	Pensacola, Fla.	1340	.5
WCOC	Meridian, Miss.	880	.5-1
WCRW	Chicago, Ill.	1210	.1
WCSC	Charleston, S. C.	1360	.5-1
WCSH	Portland, Maine	940	1-2.5
WDAE	Tampa, Fla.	1220	1
WDAF	Kansas City, Mo. (C.P. 2.5 kw-day)	610	1
WDAG	Amarillo, Texas (C.P. 2.5 kw-day)	1410	1
WDAH	El Paso, Texas	1310	.1
WDAS	Philadelphia, Penna.	1370	.1-.25
WDAY	Fargo, N. Dakota (C.P. 2.5 kw-day)	940	1
WDBJ	Roanoke, Va. (C.P. 1 kw.)	930	.5
WDBO	Orlando, Fla.	580	.25
WDEL	Wilmington, Del.	1120	.25-.5
WDEV	Waterbury, Vt.	550	.5
WDGY	Minneapolis, Minn.	1180	1-2.5
WDNC	Durham, N. C.	1500	.1
WDOD	Chattanooga, Tenn.	1280	1-2.5
WDRC	Hartford, Conn. (C.P. 2.5 kw-day)	1330	1
WDSU	New Orleans, La.	1250	1
WDZ	Tuscola, Ill.	1070	.1
WEAF	New York, N. Y.	660	50
WEAN	Providence, R. I.	780	.25-.5
WEBC	Superior, Wis.	1290	1-2.5
WEBQ	Harrisburg, Ill. (C.P. .25 kw-day)	1210	.1
WEBR	Buffalo, N. Y.	1310	.1-.25
WEDC	Chicago, Ill.	1210	.1
WEED	Rocky Mount, N. C.	1420	.1
WEEI	Boston, Mass.	590	1
WEEU	Reading, Penna.	830	1
WEHC	Charlottesville, Va.	1420	.1-.25
WEHS	Cicero, Ill.	1420	.1
WELL	Battle Creek, Mich.	1420	.05
WENR	Chicago, Ill.	870	50
WESG	Elmira, N. Y.	1040	1
WEVD	New York, N. Y.	1300	1
WEW	St. Louis, Mo.	760	1
WEXL	Royal Oak, Mich.	1310	.05
WFAA	Dallas, Texas	800	50
WFAB	New York, N. Y.	1300	1
WFAM	South Bend, Ind.	1200	.1
WFAS	White Plains, N. Y.	1210	.1
WFBC	Greenville, S. C.	1300	1
WFBE	Cincinnati, Ohio	1200	.1-.25
WFBG	Altoona, Pa.	1310	.1
WFBL	Syracuse, N. Y.	1360	1-2.5
WFBM	Indianapolis, Ind.	1230	1
WFBR	Baltimore, Md.	1270	.5
WFDF	Flint, Mich.	1310	.1
WFEA	Manchester, N. H. (C.P. 1 kw-day)	1340	.5
WFI	Philadelphia, Pa.	560	.5
WFLA	Clearwater, Fla.	620	.25-.5
WGAL	Lancaster, Pa. (C.P. .25 kw-day)	1500	.1
WGAR	Cleveland, Ohio	1450	.5-1
WGBB	Freeport, N. Y.	1210	.1
WGBF	Evansville, Ind.	630	.5
WGBI	Scranton, Pa.	880	.25
WGCM	Gulfport, Miss.	1210	.1-.25
WGCP	Newark, N. J.	1250	1-2.5
WGES	Chicago, Ill.	1360	.5-1
WGH	Newport News, Va.	1310	.1
WGL	Ft. Wayne, Ind.	1370	.1
WGLC	Hudson Falls, N. Y.	1370	.1
WGN	Chicago, Ill.	720	50
WGNY	Chester Twp., N. Y.	1210	.1
WGP	Albany, Ga.	1420	.1
WGR	Buffalo, N. Y.	550	1
WGST	Atlanta, Ga.	890	.5-1
WGY	Schenectady, N. Y.	790	50
WHA	Madison, Wis. (C.P. 2.5 kw-day)	940	1
WHAM	Rochester, N. Y.	1150	50
WHAS	Louisville, Ky.	820	50
WHAT	Philadelphia, Pa.	1310	.1
WHAZ	Troy, New York	1300	.5
WHB	Kansas City, Mo.	860	.5
WHBC	Canton, Ohio	1200	.1
WHBD	Mt. Orab, Ohio	1370	.1
WHBF	Rock Island, Ill. (C.P. .25 kw-day)	1210	.1
WHBI	Newark, N. J.	1250	1-2.5
WHBL	Sheboygan, Wis.	1410	.5
WHBQ	Memphis, Tenn.	1370	.1
WHBU	Anderson, Ind.	1210	.1
WHBY	Green Bay, Wis. (C.P. .25 kw-day)	1200	.1
WHDF	Calumet, Mich.	1370	.1-.25
WHDH	Boston, Mass.	830	1
WHDL	Tupper Lake, N. Y.	1420	.1
WHEB	Portsmouth, N. H.	740	.25
WHEC	Rochester, N. Y.	1430	.5-1
WHEF	Kosciusko, Miss.	1500	.1-.25
WHFC	Cicero, Ill.	1420	.1
WHIS	Bluefield, W. Va.	1410	.25
WHJB	Greensburg, Pa. (C.P.)	620	.25
WHK	Cleveland, Ohio	1390	1-2.5
WHN	New York, N. Y.	1010	1
WHO	(See WOC)		
WHOM	Jersey City, N. J.	1450	.25
WHP	Harrisburg, Pa.	1430	.5-1
WIBA	Madison, Wis.	1280	.5-1
WIBG	Glenside, Pa.	970	.1
WIBM	Jackson, Mich.	1370	.1
WIBU	Poynette, Wis.	1210	.1
WIBW	Topeka, Kansas (C.P. 2.5 kw-day)	580	1
WIBX	Utica, N. Y.	1200	.1-.3
WICC	Bridgeport, Conn.	600	.5-1
WIL	St. Louis, Mo.	1200	.1-.25
WILL	Urbana, Ill.	890	.25-1
WILM	Wilmington, Del.	1420	.1
WIND	Gary, Ind. (C.P. 2.5 kw-day)	560	1
WINS	New York, N. Y.	1180	1
WIOD	Miami, Fla.	1300	1
WIP	Philadelphia, Pa.	610	.5
WIS	Columbia, S. C.	1010	.5-1
WISN	Milwaukee, Wis.	1120	.25-1
WJAC	Johnstown, Pa.	1310	.1
WJAG	Norfolk, Nebr.	1060	1
WJAR	Providence, R. I.	890	.25-.5
WJAS	Pittsburgh, Pa.	1290	1-2.5
WJAX	Jacksonville, Fla.	900	1
WJAY	Cleveland, Ohio	610	.5
WJBC	La Salle, Ill. (C.P. to move to Bloomington)	1200	.1
WJBK	Detroit, Mich. (C.P. .25 kw-day)	1500	.1
WJBL	Decatur, Ill.	1200	.1
WJBO	Baton Rouge, La. (C.P.)	1420	.1
WJBW	New Orleans, La.	1200	.1
WJBY	Gadsden, Ala.	1210	.1
WJDX	Jackson, Miss.	1270	1-2.5
WJEJ	Hagerstown, Md.	1210	.1
WJEM	Tupelo, Miss. (C.P.)	990	.5
WJIM	Lansing, Mich.	1210	.1-.25
WJJD	Chicago, Ill.	1130	20
WJMS	Ironwood, Mich.	1420	.1
WJR	Detroit, Mich.	750	10
WJSV	Alexandria, Va.	1460	10
WJTL	Oglethorpe Uni., Ga.	1370	.1
WJW	Akron, Ohio (C.P. .25 kw-day)	1210	.1
WJZ	New York, N. Y.	760	30
WKAQ	San Juan, Puerto Rico	1240	1
WKAR	East Lansing, Mich.	1040	1
WKBB	East Dubuque, Ill.	1500	.1
WKBF	Indianapolis, Ind. (C.P. 1 kw-day)	1400	.5
WKBH	La Crosse, Wis.	1380	1
WKBI	Cicero, Ill.	1420	.1
WKBN	Youngstown, Ohio	570	.5
WKBO	Harrisburg, Pa.	1200	.1
WKBV	Richmond, Ind.	1500	.1
WKBW	Buffalo, N. Y.	1480	5
WKBZ	Muskegon, Mich.	1500	.1
WKEU	La Grange, Ga.	1500	.1
WKFI	Greenville, Miss.	1210	.1
WKJC	Lancaster, Pa. (C.P. .25 kw-day)	1200	.1
WKOK	Sunbury, Pa.	1210	.1
WKRC	Cincinnati, Ohio (C.P. 2.5 kw-day)	550	.1
WKY	Oklahoma City	900	1
WKZO	Kalamazoo, Mich.	590	1
WLAC	Nashville, Tenn.	1470	5
WLAP	Lexington, Ky.	1420	.1-.25
WLB	Minneapolis, Minn.	1250	1
WLBC	Muncie, Ind.	1310	.05-.1
WLBF	Kansas City, Kan.	1420	.1
WLBL	Stevens Point, Wis.	900	2.5
WLBW	Erie, Pa.	1260	1
WLBZ	Bangor, Maine (C.P. 1 kw-day)	620	.5
WLEU	Erie, Pa. (C.P.)	1420	.1-.25
WLIH	Lexington, Mass. (C.P. to move to Lowell)	1370	.1-.25
WLIT	Philadelphia, Pa.	560	.5
WLNH	Laconia, N. H. (C.P.)	1310	.1
WLS	Chicago, Ill.	870	50
WLTH	Brooklyn, N. Y.	1400	.5
WLVA	Lynchburg, Va. (C.P. .25 kw-day)	1200	.1
WLW	Cincinnati, Ohio Special authorization to use 500 kw. experimentally.	700	50
WLWL	New York, N. Y.	1100	5
WMAL	Washington, D. C.	630	.25-.5
WMAQ	Chicago, Ill. (C.P. 50 kw.)	670	5
WMAS	Springfield, Mass.	1420	.1-.25
WMAZ	Macon, Ga. (C.P. 1 kw.)	1180	.5
WMBC	Detroit, Mich.	1420	.1-.25
WMBD	Peoria, Ill.	1440	.5-1
WMBF	(See WIOD)		
WMBG	Richmond, Va.	1210	.1
WMBH	Joplin, Mo.	1420	.1-.25
WMBI	Chicago, Ill.	1080	5
WMBO	Auburn, N. Y.	1310	.1
WMBQ	Brooklyn, N. Y.	1500	.1
WMBR	Jacksonville, Fla.	1370	.1
WMC	Memphis, Tenn.	780	.5-1
WMCA	New York, N. Y.	570	.5
WMEX	Chelsea, Mass. (C.P.)	1500	.1-.25
WMMN	Fairmont, W. Va.	890	.25-.5
WMPC	Lapeer, Mich.	1200	.1
WMT	Waterloo, Iowa	600	.5-1
WNAC	Boston, Mass. (C.P. 2.5 kw-day)	1230	1
WNAD	Norman, Okla.	1010	1
WNAX	Yankton, S. Dak.	570	1-2.5
WNBF	Binghamton, N. Y.	1500	.1
WNBH	New Bedford, Mass.	1310	.1-.25
WNBO	Silverhaven, Pa.	1200	.1
WNBR	Memphis, Tenn.	1430	.5
WNBX	Springfield, Vt. (C.P. 1 kw.)	1260	.5
WNBZ	Saranac Lake, N. Y.	1290	.05
WNEL	San Juan, Puerto Rico (C.P.)	1290	.5
WNEW	Newark, N. J.	1250	1-2.5
WNOX	Knoxville, Tenn.	560	1-2
WNRA	Muscle Shoals City, Ala.	1420	.1
WNYC	New York, N. Y.	810	.5-1
WOAI	San Antonio, Tex.	1190	50
WOC	Des Moines, Iowa	1000	50
WOCL	Jamestown, N. Y.	1210	.05
WOI	Ames, Iowa	640	5
WOKO	Albany, N. Y.	1430	.5-1
WOL	Washington, D. C. (C.P. .25 kw-day)	1310	.1
WOMT	Manitowoc, Wis.	1210	.1
WOOD	Grand Rapids, Mich.	1270	.5
WOPI	Bristol, Tenn.	1500	.1
WOR	Newark, N. J. (C.P. 50 kw.)	710	5
WORC	Worcester, Mass.	1200	.1
WORK	York, Pa.	1000	1
WOS	Jefferson City, Mo	630	.5
WOSU	Columbus, Ohio	570	.75-1
WOV	New York, N. Y.	1130	1
WOW	Omaha, Nebr. (C.P. 2.5 kw-day)	590	1
WOWO	Ft. Wayne, Ind.	1160	10
WPAD	Paducah, Ky. (C.P. .1-.25 kw.)	1420	.1
WPEN	Philadelphia, Pa. (C.P. 920 kc., .25 kw.)	1500	.1-.25
WPFB	Hattiesburg, Miss.	1370	.1
WPG	Atlantic City, N. J.	1100	5
WPHR	Petersburg, Va. (C.P. 880 kc., .5 kw.)	1200	.1-.25
WPRO	Providence, R. I.	1210	.1
WPTF	Raleigh, N. C. (C.P. 5 kw.)	680	1
WQAM	Miami, Fla.	560	1
WQAN	Scranton, Pa.	880	.25
WQBC	Vicksburg, Miss.	1360	.5-1
WQDM	St. Albans, Vt.	1370	.1
WQDX	Thomasville, Ga.	1210	.1
WRAK	Williamsport, Pa. (C.P. .25 kw-day)	1370	.1
WRAW	Reading, Pa.	1310	.1
WRAX	Philadelphia, Pa. (C.P. 930 kc., .5 kw-day)	1020	.25
WRBL	Columbus, Ga.	1200	.1
WRBX	Roanoke, Ga.	1410	.25-.5
WRC	Washington, D. C.	950	.5-1
WRDO	Augusta, Maine	1370	.1
WRDW	Augusta, Ga.	1500	.1
WREC	Memphis, Tenn.	600	.5-1
WREN	Lawrence, Kansas	1220	1
WRGA	Rome, Ga.	1500	.1
WRJN	Racine, Wis.	1370	.1
WROK	Rockford, Ill.	1410	.5
WROL	Knoxville, Tenn.	1310	.1
WRR	Dallas, Texas	1280	.5
WRUF	Gainesville, Fla.	830	5
WRVA	Richmond, Va.	1110	5
WSAI	Cincinnati, Ohio	1330	1-2.5
WSAJ	Grove City, Pa.	1310	.1
WSAN	Allentown, Pa.	1440	.25
WSAR	Fall River, Mass.	1450	.25
WSAZ	Huntington, W. Va.	1190	1
WSB	Atlanta, Ga.	740	50
WSBC	Chicago, Ill.	1210	.1
WSBT	South Bend, Ind.	1360	.5
WSEN	Columbus, Ohio	1210	.1-1
WSFA	Montgomery, Ala	1410	.5
WSGN	Birmingham, Ala. (C.P. .25 kw-day)	1310	.1
WSIX	Springfield, Tenn.	1210	.1
WSJS	Winston-Salem, N. C.	1310	.1
WSM	Nashville, Tenn.	650	50
WSMB	New Orleans, La.	1320	.5
WSMK	Dayton, Ohio	1380	.2
WSOC	Charlotte, N. C.	1210	.1-.25
WSPA	Spartanburg, S. C. (C.P. 1 kw., 920 kc.)	1420	.1-.25
WSPD	Toledo, Ohio (C.P. 3.5 kw. day)	1340	1
WSUI	Iowa City, Iowa	880	.5
WSUN	(See WFLA)		
WSVS	Buffalo, N. Y.	1370	.05
WSYB	Rutland, Vt.	1500	.1
WSYR	Syracuse, N. Y.	570	.25
WTAD	Quincy, Ill.	1440	.5
WTAG	Worcester, Mass.	580	.5
WTAM	Cleveland, Ohio	1070	50
WTAQ	Eau Claire, Wis.	1330	1
WTAR	Norfolk, Va.	780	.5-1
WTAW	College Station, Texas	1120	.5
WTAX	Springfield, Ill. (C.P. 1300 kc., .25-1 kw.)	1210	.1
WTBO	Cumberland, Md.	800	.25
WTCN	Minneapolis, Minn.	1250	1
WTFI	Athens, Ga.	1450	.5
WTIC	Hartford, Conn.	1060	50
WTJS	Jackson, Tenn.	1310	.1-.25
WTMJ	Milwaukee, Wis.	620	1-5
WTNJ	Trenton, N. J.	1280	.5
WTOC	Savannah, Ga. (C.P. 1 kw.)	1260	.5
WTRC	Elkhart, Ind.	1310	.05-.1
WVFW	Brooklyn, N. Y.	1400	.5
WWAE	Hammond, Ind.	1200	.1
WWJ	Detroit, Mich.	920	1
WWL	New Orleans, La.	850	10
WWNC	Asheville, N. C.	570	1
WWRL	Woodside, N. Y.	1500	.1-.25
WWSW	Pittsburgh, Pa.	1500	.1-.25
WWVA	Wheeling, W. Va.	1160	5
WXYZ	Detroit, Mich.	1240	1

C.P.—Construction permit. Where two powers are given, the first one is used at night, the second in daytime

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ONE DX'ER'S VERIFICATIONS

The verifications shown here are only a part of those displayed on the walls of one fan's radio room—and cover reception of programs from all corners of the globe

Verifying DX RECEPTION

A "verification" card or letter issued by broadcast and short-wave stations represents the most authentic proof of long-distance reception. This article suggests the best procedure in applying for a "veri."

Robert Hertzberg

ONE of the incidental pleasures of long-distance reception, on either short-wave or broadcast bands, is obtaining written verifications from the foreign stations. Many of these "veris" are elaborate, multi-colored documents and are well-worth framing; even the simpler and less pretentious ones make good exhibits when you have company and want to show off your standing as a DX fan of international accomplishments.

Merely hearing a foreign station is only the first step in the process of getting a veri. You must appreciate the fact that writing to a foreign country is not like requesting a catalog from a nearby mail-order house. The first and most important rule is: WRITE PLAINLY! If at all possible, typewrite your letter or have someone else do it for you. At most of the radio stations in Europe, Asia and South America there is someone with at least a book knowledge of English, but the undecipherable scrawl that most radio fans seem to have means nothing to them. You're lucky if they can make head or tail of a clearly typed report!

Use plain white paper, and write on only one side of the sheet. Spell out the name of your town and state. To a person unfamiliar with domestic geography, N.Y., N.J., N.H. and N.M. all look somewhat alike.

If you can find the full street and city address of the foreign station in any of the published call lists, put it on your outgoing envelope. If you can't, the mere call letters or name of the station, the city and country are enough. Outside of the United States practically all radio stations are government controlled, and the postal authorities know where to deliver anything marked "radio." Of course, put your own name and full address, including "U.S.A." after the state, on the outside of the envelope.

A perfunctory report like "I heard your signals. Please send me a verification" is likely to bring back an equally meaningless acknowledgment (if any) that you won't even want to show to friends. Don't be afraid to go into details; the foreign stations like it. At one time the French used to send short-wave listeners a five-page mimeographed questionnaire, in which they asked about everything except the condition of the DX-er's teeth. Give as much "dope" as you have time for on the following topics: (1) Exact time of reception — specify Eastern, Central, Mountain or Pacific Time, or better still, Greenwich Time; (2) what you heard—names of selections or kind of music, exact time of announcements, talks, weather or news reports, etc.; (3) how long you listened to program; (4) comparative strength and clarity of signals, fading, extent of atmospherics, etc.; (5) weather conditions at the time —some listeners even give barometer readings; (6) type of receiving set—regenerative, t.r.f., or superhet; (7) length and direction of aerial; (8) entertainment value of program; (9) how signals compare generally with those of other stations in nearby countries.

Giving the station an idea of signal strength is a problem, as there is no standard of comparison and even two persons listening to the same program from the same loud speaker often cannot agree on any numerical value in the "R" or "QSA" scales. In the writer's opinion, "QSA2" or "QSA4" convey little to a person 4000 miles away. A better picture of receiving conditions is given if you say something like "Music clearly audible throughout a three-room apartment," or "Signals heard fifty feet from loud speaker standing in open window." The station engineers can then at least visualize your receiving conditions and get some real idea as to how the signals came through. Above all make your report truthful—don't exaggerate.

Information on point 9 is especially welcome to foreign stations, particularly the short-wavers. The politically embroiled countries of Europe are frankly out to develop world-wide audiences for their radio stations, as a means of putting over their own ideas and propaganda, and they are most anxious to learn how they are faring in the battle. If you send in regular reports, say at weekly or bi-weekly intervals, you are likely to be rewarded with beautiful photographs, engraved diplomas and even special stamps. The writer knows of more than one philatelist who took up DX reception because of the valuable stamps the veris often bear!

The fact that the French stations naturally answer your letters in French, the Germans in German and the Italians in Italian merely makes the verifications more interesting. You expected them to read your English; why shouldn't they expect you to read their languages? Fortunately, the Russians write in neatly typed English! It is surprisingly easy to guess at most of the contents of these letters, even if you've forgotten what little French, German or Spanish you did assimilate at high school.

More and more the foreign stations are realizing the good-will value of a verification in the language of the person who sent in a report, and many veris do come through in English, even if the phrasing is ludicrous in places, and the genders are somewhat mixed. The acknowledgments from certain of the Central American stations in particular are actually scream provoking. But remember the writers of these letters are oftentimes going to a great deal of trouble in trying to use English *for your convenience and benefit.*

No matter what else you put into your outgoing envelope, you must be sure to include return postage. Now for years (*Continued on page* 517)

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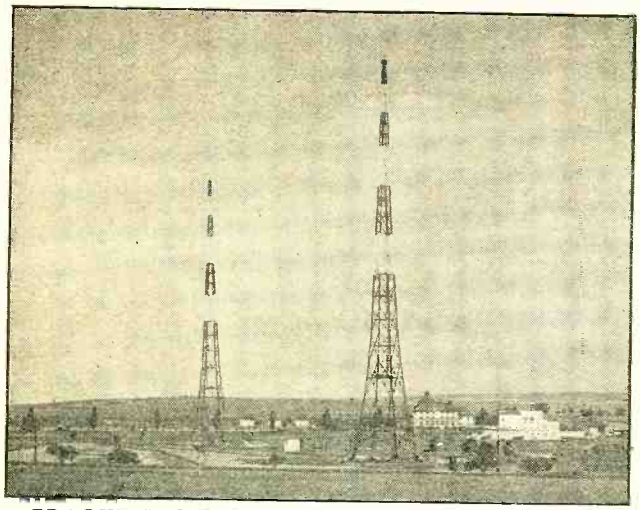


PRAGUE I, CZECHOSLOVAKIA, 638 KC., 120 KW.
This station at Liblice, with KFI going full blast only 2 kc. above, was one of the large number tuned in during this night's session

SUNSET TO SUNRISE *with* FOREIGN DX

This story of one night's DX reception contains much information of use to those who want to take a shot at foreign stations on the regular broadcast band

R. H. Tomlinson

Part One

BROADCAST band DX'ing is definitely on the increase, due mainly to the sensitivity and selectivity of our modern receivers. West Coast, Mexican and Canadian stations, unless of very low power, are only back yard catches to the real DX'er. As many or probably more stations and countries can be logged on long waves as on the short wave bands, in any given length of time. Of course, when short wave fans listen for the Australian and Asiatic stations, they must be up before sunrise, so it is with long waves.

In the words of a famous son of New York, "Let's look at the record." The "record" in this instance is a little black log book kept on my receiver. Let's examine it closely and see just what can be heard on the regular broadcast band between 540 and 1500 kc. with say six hours' tuning. We have been taken on trips around the world by short-wave writers, suppose I point out just how easy this can be accomplished on long waves. To the average listener, reception from Europe must be had from the English or German short-wave stations. We do this on the regular broadcast band with as much ease and get far less fading and hear many times the number of stations than you can on short waves.

A typical example of what can be heard in the early evenings is shown under the date of Saturday, November 17th. I started tuning at 4:20 p.m., E.S.T. The first station logged was at 4:22 on 977 kc., West Regional in Cardiff, Wales. An opera was being relayed from London. Perfect loudspeaker reception was had until 6 p.m., when news bulletins were given, to be followed at 6:15 by a dance band from the Mayfair. Between selections, starting at 4:30 p.m., I tuned for others, and on 804 kc. the Scottish Regional station was heard with the same program. Going to 959 kc., Poste Parisien was giving news in French, followed by a concert orchestra. Then at 5:30 p.m., 575 kc. produced Stuttgart, Germany, with a band concert from the open court of the Broadcasting House, Berlin. Hamburg on 904 kc. is next tuned in at 6:10 p.m., with operatic selections. The next frequency was 950, where Breslau, Germany, was giving WRC a battle and, to our surprise, pushed him right out of the picture. One more Frenchman is needed, so to 913 kc. now, where Toulouse is holding sway with a Frenchman talking. What about Italy? Tuning to 1140 kc., I1TO, Turin, is heard, with a lady talking. By 7 p.m. our locals were too much, so I hit for the South Americans. YV1RC, Caracas, on 960 kc., is our first. First a guitar selection and then the announcer plugs away at some tobacco ad. At 7:30 p.m., LS2 in Buenos Aires is pounding in on 1190 kc., with an orchestra. Two tangos and a waltz, and we waltz away, looking for more. 630 kc. produces a Spanish gentleman, which turns out to be LS3, also in Buenos Aires. Crossing over WENR at 7:45, we hear more Spanish in the background. During a lull in a sketch on WENR, this is identified as LR6. Heavy static is present by now. Sum total to this time is 9 Europeans and 4 South Americans—not bad for one evening's tuning.

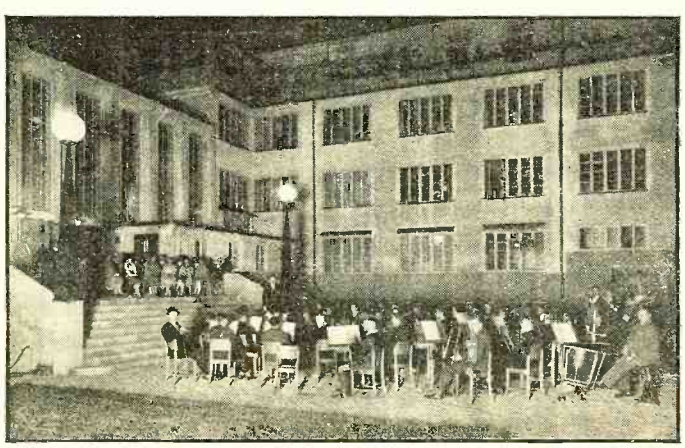
Can Europe be tuned in each evening? Sunday, November 18th, the West Regional transmitter was again tuned in at 4:30 p.m., with the Wireless Military Band. The Scottish Regional station was also logged. We hated to leave West Regional, so listened until sign-off at 5:45, when they played "God Save the King." The signal strength from this station both evenings was excellent on loudspeaker, with no fading.

Most of the European stations are heard after midnight. Accordingly midnight Sunday finds me again at the set. It is now 5 a.m. in England and the European stations are just starting their day's transmissions. My first station is Hamburg on 904 kc. at 12:15 a.m., with morning exercises. Next, tuning to 638 kc., 2 kc. away from KFI, Prague is pounding in, also with a gym class, followed by recordings. I log these two until 12:45, then skip up to 546 kc. Budapest is just coming on with a lady announcing and giving exercises also. I now go down the dial to 785 kc. and find Leipzig holding sway with band music, with only slight interference from KGO. I alternate between these four, getting enough from each for a report. 1 a.m. announces itself with 658 kc. producing Cologne, Germany, with Cologne at excellent volume, giving news items in German and following an orchestral concert. Going to 740 kc. at 1:10, I find Munich even better than Cologne, carrying the same program as Leipzig. 1:20 finds the dial set at 950 kc., where Breslau, another German, is pounding in with an orchestra. Interference here from WRC testing, so I turn to 841 kc., where Berlin has a lady giving cooking lessons! I alternate between these four until 1:35 and then find Rome on 714 with our lady friend announcing. WGN is giving

(*Continued on page* 524)

MUNICH, GERMANY
740 KC., 100 KW.

A scene during a broadcast from the outdoor studio in the open court of Broadcast House



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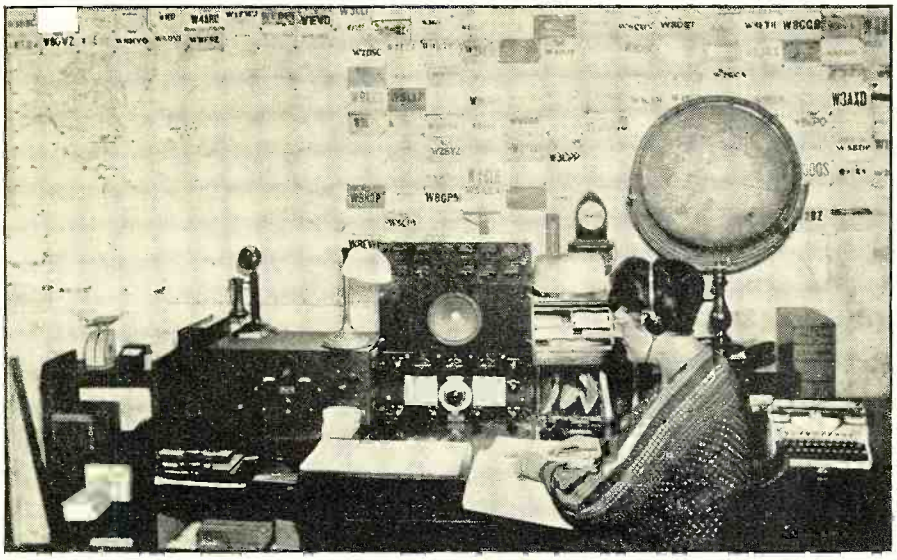


MEET MRS. W9DXX

This is the "Ham" shack of Alice R. Bourke, of Chicago, Illinois, owner and operator of amateur radio station W9DXX. She is the first "YL" to be inducted into the honorable order of Short Wave Pioneers. Notice the QSL cards she has received from other amateurs all over the world.

THE "HAM" SHACK

CQ CQ CQ

ONE of the greatest problems the amateur has is the erection of an antenna. Too often the importance of the radiating system is neglected. Regardless of the amount of power used, the antenna should be carefully designed and erected. Stopping to reflect for a minute, it will be found that it is the station with the carefully constructed antenna system, regardless of power, that does the best DX and puts in the strongest signal.

BASICALLY, the ideal antenna is one which is either half wavelength or full wavelength long and about quarter wavelength above ground. In this era of small backyards these ideal specifications seldom are attainable, particularly on the lower-frequency amateur bands. On the 7000- and 14,000-kilocycle bands such an antenna is not difficult to put up. On the latter two frequencies a quarter wavelength is only thirty-three and fifteen feet, respectively. Frequently an antenna strung in a large attic will give surprisingly good results on these bands. But, on the popular bands of 3500 and 1750 kilocycles, the stringing of an antenna quarter wavelength above ground becomes more difficult. On 3500 kilocycles, the ideal height is roughly about 65 feet, and on 1750 kc. it amounts to the almost impossible figure of 132 feet.

If operation is to be done on the two higher-frequency bands, every effort should be made to have an antenna of ideal height. If the lower-frequency channels are chosen for operation, the antenna should be erected as high as possible. These figures are, of course, for the so-called Hertz-type antenna. In the case of the Marconi type, where it is necessary to use either a ground or a counterpoise, a portion of the aerial runs through a coupling device to the ground. This reduces the electrical height; it is impossible to erect a Marconi antenna more than an average height between ground and the highest point of the antenna. Therefore, the ideal Marconi antenna would be one that is strung vertically.

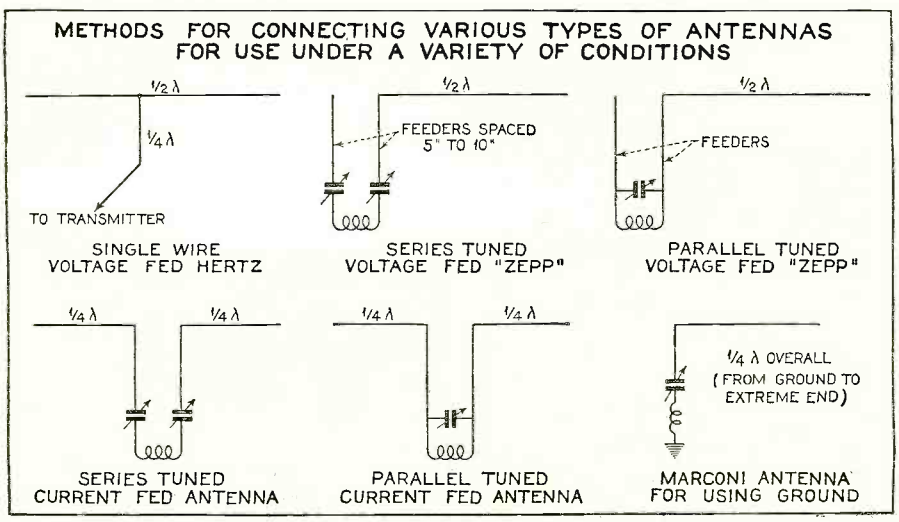
Many amateurs have asked what method is the best for coupling the transmitter to the antenna: voltage feed or current feed; also, if it is more desirable to use either a doublet or a single-wire feeder. The answer is: one is as good as the other. The one to use is the one that is most adaptable to a particular location. If it is more convenient to feed the middle of the antenna because the "shack" is situated at the middle of the "location," by all means use that method. If feeding at the end is more feasible, use that arrangement, and if one wants to use a single-wire feeder because of the appearance, that is the one to select. The point is that any of the accepted systems (when properly constructed) will give about the same results. However, for the "ham" who lives in an apartment, the single-wire, voltage-feeding arrangement is ideal. It permits erecting the antenna without regard to the feeder length. The feeder may be from twenty to 200 feet from the radiator.

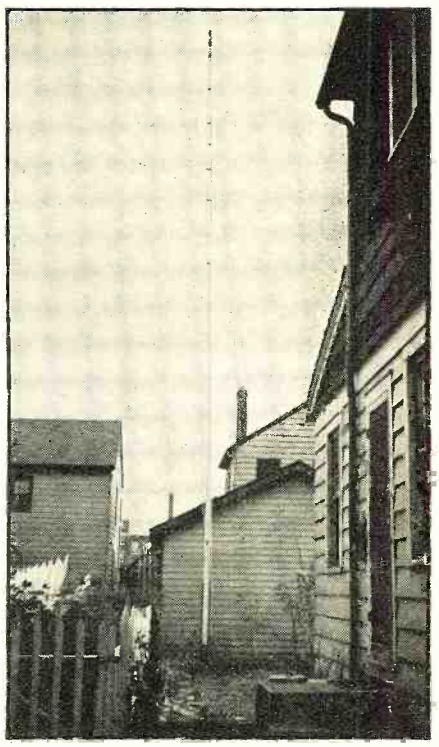
There are, however, a few points to bear in mind. For instance, the length of the wire, for either the current-fed or the doublet, is not critical. Any length in the vicinity of half wavelength will be flexible and will give good efficiency on any part of the band it is designed to operate, or the "harmonic bands." However, in the construction of this type antenna, the feeders should be cut to a quarter wavelength or any multiple thereof. That is, 15 feet, 30, 45, 60 or 120 feet, and so on. The most desirable feeder length is quarter wavelength for the highest band on which the transmitter is to operate. If multi-band operation is contemplated, both series and parallel tuning feeders should be provided. Series tuning should be used whenever possible. The feeders may be doubled back in order to gain the correct length, if necessary, and if this arrangement is not feasible, the Collins or "pi" network (which was discussed in this department in the October issue) should be employed. The tuning methods for different lengths of antennas, where multi-wire feeders are em-

(*Continued on page* 498)

TABLE 1

BAND	FEEDER LENGTHS IN FEET					
	120	90	60	45	30	15
1,750 Kc.	SERIES	PAR.	SERIES	(NOT RECOMMENDED)		
3,500 "	PAR.	SERIES	SERIES	PAR	(NOT RECOMMENDED)	
7,000 "	PAR.	SERIES	PAR.	SERIES	SERIES	PAR.
14,000 "	PAR.	PAR.	PAR.	PAR.	PAR.	SERIES





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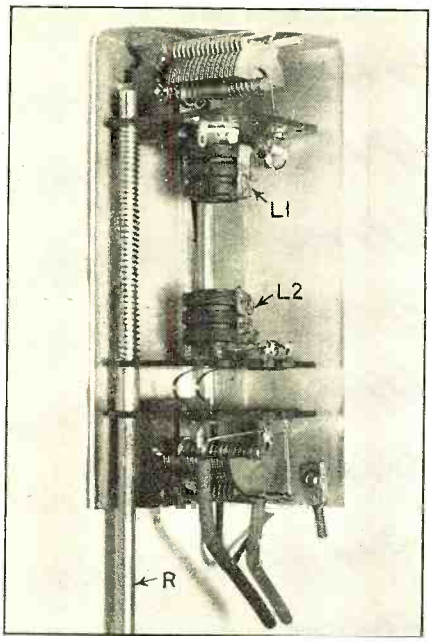

THE NEW I.F. UNIT

Figure 1. Coupling between L1 and L2 is varied by pushing in rod "R." The rods on two or more transformers may be ganged for control from the panel, providing the exact combination of fidelity and selectivity desired under any receiving conditions

Fidelity and Selectivity with

VARIABLE I. F. COUPLING

The growing demand for high-fidelity receivers has been difficult to satisfy without sacrificing selectivity. Now both are obtainable through the use of newly developed i.f. transformers

A. A. Webster

INTERMEDIATE - FREQUENCY transformers have gone through a surprising evolution since the first introduction of superheterodyne receivers. Only a few years ago, i.f. transformers presented much the same appearance as audio-frequency transformers. Experimenters of those days will remember these iron-core transformers well. With the introduction of screen-grid tubes, the swing was toward air-core transformers. The earliest of these were more or less tuned to a certain frequency by their own characteristics. Later one or both windings were tuned by adjustable mica-dielectric condensers. This type of i.f. transformer was standard for some years, then in 1933 the accurate maintenance of tuning was obtained by replacing these mica condensers with air-dielectric condensers. These improved transformers were made available to the experimenter and set builder by the National Company and the Hammarlund Company, and were welcomed with open arms because they made alignment easier and were far more stable because they were less affected by changes in humidity and temperature, vibration, etc.

The modern trend toward high-fidelity receiver circuits has brought about another distinct advance. Heretofore the trend has been more and more toward high gain and high selectivity. The latter is a feature, however, not compatible with the practical attainment of high-fidelity reproduction because, with the large number of tuned circuits employed in modern multi-stage superheterodynes, side band cutting has been present to a rather marked degree.

While high-fidelity is in greater demand by the listening public, good selectivity is likewise demanded and these conflicting demands have provided many a headache for the design engineer. Various solutions or partial solutions have been worked out, but most of them to date have left something to be desired. The i.f. transformers described here, however, seem to have solved the problem in a manner which is not only effective, but highly practical.

SELECTIVITY CHARACTERISTICS

Figure 2. These curves of a single transformer were plotted from actual measurements made at six different coupling adjustments. Anything from extreme selectivity (Curve "A") to wide-band high fidelity (Curve "C") is obtainable at will from this new i.f. system

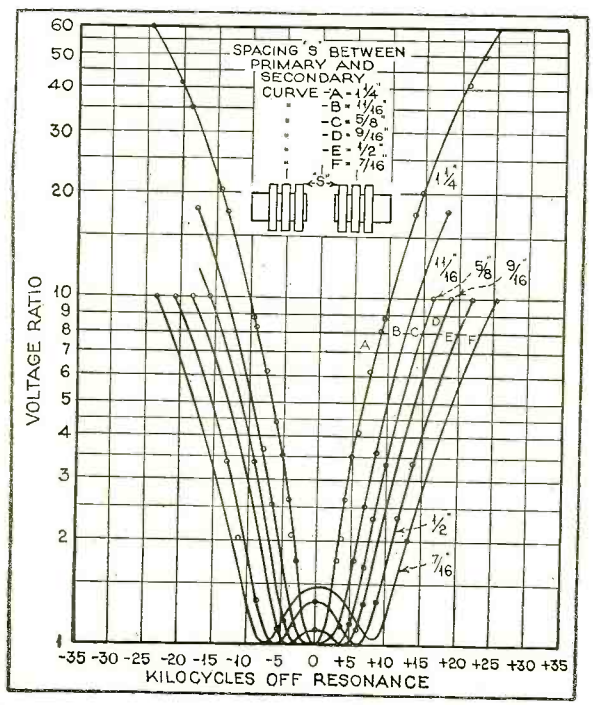

Figure 1 shows a new transformer which was developed by the Hammarlund engineers and is now available to the public and to manufacturers. For the purposes of photography, half of the shield can has been cut away to disclose the assembly. Basically the transformer consists of pie-wound primary and secondary coils, each tuned with 100 mmf. air-dielectric condensers. The real feature of the transformer is the variable coupling provided between the coils. By means of a brass rod, which extends through the bottom of the transformer, the spacing between the primary and secondary can be changed from less than ½ inch to approximately 1 inch. With the spacing adjusted to this latter extreme, a high degree of selectivity is possible, whereas with the coils adjusted for maximum coupling the selectivity curve is broadened out to a point which eliminates side-band cutting and provides excellent fidelity. Thus the operator of a receiver which employs these transformers in the i.f. amplifier can, by means of a knob on the front panel, adjust the degree of selectivity and fidelity to suit his requirements and particular conditions under which he is operating. The logical way of accomplishing this result in designing a receiver is to provide gang control of these coupling adjustments.

Figure 2 shows the selectivity characteristic of one of these transformers for different adjustments of the coupling. Curve A was made with the coils spaced 1¼ inches apart, curve F with the coils 7/16 inch apart, and curves B, C, D, and E show the selectivity at various adjustments between these two extremes. In studying these curves, it should be borne in mind that they represent measurements on a single transformer. Normally, two, three, or four of these transformers would be used on an i.f. amplifier and the over-all selectivity of such an amplifier would, of course, be far greater than that indicated in the curves of Figure 2.

No attempt is made on this figure (*Continued on page 520*)

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A Frank Discussion of

OHMMETER DESIGN

In this, the second, installment the author gives exhaustive data on home-made ohmmeters, with suggestions on how to minimize errors

Alfred R. Gray

Part Two

THE chart in Figure 2 is a table of values for the construction of ohmmeters with various ranges from .1 ohm to 50 megohms, using meters usually found on the experimenter's bench. They are listed by center scale reading, instead of range; because the portion of the scale, where accurate readings may be obtained, of any ohmmeter, is from about .3 to 3 times the center-scale reading, as pointed out above. The useful portion is from about 1 to 10 times the center-scale reading where additional inaccuracy of about 4 per cent will be introduced, due to error in adjusting the pointer to the ends of the scale, and errors in reading. The portion that may be used for approximate indications, from about .02 to 50 times the center scale reading, where additional error of about 24 per cent will be introduced, the increase in error being caused by the decrease in the size of the divisions, and the decrease in the distance to the ends of the scale. Obviously an ohmmeter is almost useless beyond these limits, unless a laboratory type meter with a long scale is used, and then very little can be gained, compared to the increased accuracy made possible by the incorporation of additional ranges.

It can be seen from the above, that a manufacturer conveys little information when he states that his ohmmeter has a range of 0-500,000 ohms, for example; as the center scale reading might be anything from 5,000 to 20,000 ohms, with almost any accuracy from 6% to 30% or worse. When we say, "This is a 1,000 ohm-per-volt meter, reading 0-100 volts d.c. 2%", we know quite definitely what to expect from it. Had we known that the movement only was accurate to 2%, but knew nothing about the resistor, we would know very little. In order to make ohmmeter designations definite, and eliminate the present ohmmeter confusion, the author suggests that a representative ohmmeter range be listed as:

1,000—10,000 (3,5000) ohms 8%

3,500 ohms being some value within 10% of center scale and 8% being the greatest calculated circuit error (including resistor tolerances) between 1,000 and 10,000 ohms (which in this case is approximately .3 to 3 times center scale), plus the meter and reading errors (about 5% for a 2% meter accuracy).

Returning to Figure 2, values are given for ranges in decimal steps. This allows the experimenter to choose ranges most suitable for his work. For each range, values are given for three or more popular meters. In the E column, reference is made to several notes. These notes should be followed because accuracy of measurement on some ranges is effected by the internal resistance of the battery, and the resistors in the table have been corrected for the batteries specified in the notes, RFA, RVA, etc., at the heads of the columns, refer to the corresponding letters in the proper diagram of Figure 1. The values given for RMA, in the upper half of the column, include the meter resistance; so the meter resistance, at room temperature must be known, or the total resistance (meter and resistor in series) must be adjusted to the value shown. If any reader has difficulty in getting this work done, an inquiry addressed to the author, in care of RADIO NEWS, will bring information as to where the job can be done at a very reasonable price.

Other resistors in the table are standard stock items of the Precision Resistor Co. In ordering these resistors, both the resistance value and the tolerance (given at the top of the column) should be specified. RVA is a rheostat, and may be any resistance between the values shown. If a rheostat near the low limit is selected, adjustment will be provided down to 1.2 volts per cell. If a rheostat near the high limit is selected adjustment will be provided down to 1.13 volts per cell. A rheostat should be used that has a large number of turns, in order to provide a fine adjustment. The Yaxley air-cooled rheostat is very satisfactory, and most of the values in the table, may be found among their stock items as shown in Figure 4.

On the low ranges Note 1, (Figure 2,) should be carefully followed, and the switch in Figure 1 (D) should be of very low contact resistance. On the 1 ohm and 0.1 ohm ranges, the switch should be rated 5 amperes and 30 amperes or more respectively. All joints should be securely soldered, where possible, and test leads should be fastened to heavy terminals. Eby "Commander" binding posts are satisfactory. Weston test leads are satisfactory, except on the lowest ranges, where new, larger leads must be added, in accordance with Note 1, Figure 2.

The errors listed in Figure 2 are the maximum possible errors, providing instructions are followed. According to the theory of probabilities, however, the errors will be between zero and half the value listed, 70 per cent of the time, and less than two-thirds the value listed, 90 per cent of the time.

Figure 3 is a scale which has had all the sources of error minimized, and which will fit the meters listed in the table. This may be fastened to the scale as follows: Remove the scale carefully, so as not to bend the pointer. Do not leave the meter without the protection of the glass. Give the back of the metal scale a thin coat of shellac and allow it to dry over night. Cut out the paper scale through the center of the proper outline, and place it scale side down on a clean blotter which is laying down on a flat surface. Place the metal scale on the paper scale with the shellac side down. Heat a (*Continued on page* 520)

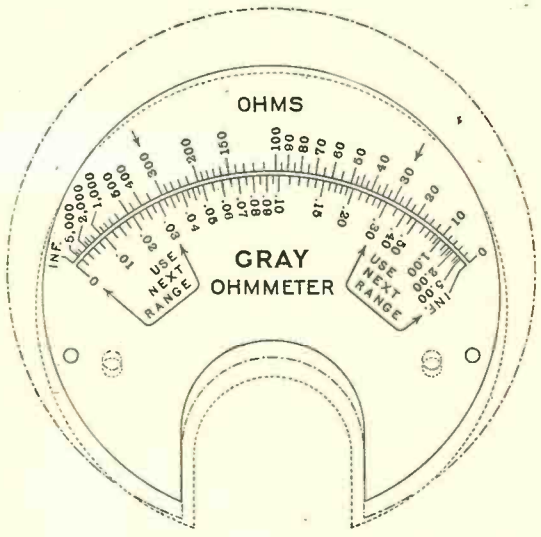

FIGURE 3. CALIBRATED METER SCALE

This scale is correct size to fit standard meters. For Jewell type 88, cut on dotted line; for Weston type 301 cut on solid line; and for Jewell type 54 cut on dot-dash line. Duplicates of this scale, printed on strong paper, may be obtained by sending ten cents to RADIO NEWS *Blueprint Department, 461 Eighth Avenue, New York City*

VALUES OF R_{VA} IN FIG. 2	CATALOG No. AND RATING OF YAXLEY AIR-COOLED RHEOSTAT
1 OHM	102 K (2 OHMS) WITH 2 OHM 5% FIXED RESISTOR IN PARALLEL
10 OHMS	110 K (10 OHMS)
100 "	199 P (100 ")
1000 "	1000 P (1000 ")
3.5 - 6.2 OHMS	106 K (6 ")
2.6 - 4.65 "	103 K (3 ")
2.5 - 4.4 "	103 K (3 ")
7.5 - 15.0 "	110 K (10 ")
10.4 - 18.4 "	115 K (15 ")
12.1 - 21.4 "	120 K (20 ")
25 - 44 "	140 K (40 ")
29 - 52 "	140 K (40 ")
35 - 62 "	150 P (50 ")
75 - 150 "	199 P (100 ")
104 - 184 "	200 P (200 OHMS) WITH 500 OHM 5% FIXED RESISTOR IN PARALLEL
121 - 215 "	200 P (200 OHMS)
200 - 350 "	200 P (200 ")

FIG. 4

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CENTER SCALE READING (OHMS)	BASIC CIRCUIT ACCURACY (DOES NOT INCLUDE METER AND READING ERRORS BUT INCLUDES RESISTOR TOLERANCES).	ACCURATE RANGE (OHMS) AND MAXIMUM POSSIBLE ERROR, INCLUDING 5.05% POSSIBLE METER AND READING ERROR AT ONE END OF RANGE (MAXIMUM ERROR 1% LESS AT CENTER).	USEFUL RANGE (OHMS) AND MAXIMUM POSSIBLE ERROR, INCLUDING 8.83% POSSIBLE METER AND READING ERROR AT ONE END OF RANGE (MAX. ERROR 1% LESS AT OTHER END)	INDICATING RANGE (OHMS) AND MAXIMUM POSSIBLE ERROR, INCLUDING 28.6% POSSIBLE METER AND READING ERROR AT ENDS OF RANGE.	METER USED (SEE RANGE) →	RANGE OF METER (MILLIAMPERES)	DIAGRAM USED (FIGURE 1)	E (VOLTS) (FOR SIZE OF BATTERY SEE PROPER NOTE)	R_{FA} (OHMS) ±2% (±1% IS OF COURSE O.K.)	R_{VA} (OHMS) MAY BE ANY RESISTANCE BETWEEN VALUES SHOWN.	R_{MA} (OHMS) ±½ OF 1% OR ±1% IF OTHER IS NOT AVAILABLE (R_M MUST BE KNOWN TO SAME ACCURACY).	● R_{FC} (OHMS) ± ½ OF 1% OR ±1% IF OTHER IS NOT AVAILABLE.
0.1	1.15%	0.03-0.3 ±6.2% SEE NOTE 1	0.01-1 ±10%	0.002-5 ±29.8%	WESTON MODEL 301 OR JEWELL PATTERN 54 OR 88	1	D	1.5 NOTE 2	248	1 ±10%	43.24 $-R_M$	0.1002
"	"	"	"	"	WESTON MODEL 301 ONLY	1.5	"	"	"	"	28.83 $-R_M$	0.1003
"	"	"	"	"	"	2	"	"	"	"	21.62 $-R_M$	0.1005
1	"	0.3-3 ±6.2% SEE NOTE 1	0.1-10 ±10%	0.02-50 ±29.8%	WESTON MODEL 301 OR JEWELL PATTERN 54 OR 88	1	"	1.5 NOTE 3	25.0	10 ±10%	43.24 $-R_M$	1.024
"	"	"	"	"	WESTON MODEL 301 ONLY	1.5	"	"	"	"	28.83 $-R_M$	1.036
"	"	"	"	"	"	2	"	"	"	"	21.62 $-R_M$	1.049
10	"	3-30 ±6.2%	1-100 ±10%	0.2-500 ±29.8%	WESTON MODEL 301 OR JEWELL PATTERN 54 OR 88	1	"	1.5 NOTE 4	254	100 ±10%	43.24 $-R_M$	13.01
"	"	"	"	"	"	1.5	"	3 NOTE 5	251	"	57.65 $-R_M$	12.10
"	"	"	"	"	"	2	"	"	"	"	43.24 $-R_M$	13.01
"	"	"	"	"	"	3	"	"	"	"	28.83 $-R_M$	15.31
"	"	"	"	"	"	5	"	"	"	"	17.30 $-R_M$	23.75
"	"	"	"	"	"	10	"	4.5 NOTE 6	247	"	12.97 $-R_M$	43.65
"	3.7%	3-30 ±8.75%	1-100 ±12.5%	0.2-500 ±32.3%	WESTON MODEL 301 ONLY	100	C	1.5 NOTE 3	1.5	3.5-6.2	NOT USED	8.66
"	3.5%	3-30 ±8.55%	1-100 ±12.3%	0.2-500 ±32.1%	JEWELL PATTERN 88 ONLY	"	"	"	1.15	2.6-4.65	"	8.84
"	"	"	"	"	JEWELL PATTERN 54 ONLY	"	"	"	1.08	2.5-4.4	"	8.89
100	1.15%	30-300 ±6.2%	10-1,000 ±10%	2-5,000 ±29.8%	WESTON MODEL 301 OR JEWELL PATTERN 54 OR 88	1	D	15. NOTE 7	2,529	1,000 ±10%	432.4 $-R_M$	130.1
"	1.85%	30-300 ±6.9%	10-1,000 ±10.7%	2-5,000 ±30.5%	WESTON MODEL 301 ONLY	"	C	1.5 NOTE 8	4.15	7.5-15.0	3.0	95.78
"	1.88%	30-300 ±6.93%	"	"	JEWELL PATTERN 88 ONLY	"	"	"	4.6	10.4-18.4	3.333	95.57
"	1.93%	30-300 ±6.98%	10-1,000 ±10.8%	"	JEWELL PATTERN 54 ONLY	"	"	"	5.4	12.1-21.5	3.888	95.22
"	2.8%	30-300 ±7.85%	10-1,000 ±11.6%	2-5,000 ±31.4%	JEWELL PATTERN 88 ONLY	10	"	1.5 NOTE 4	10.8	25-44	NOT USED	90.18
"	3%	30-300 ±8.05%	10-1,000 ±11.8%	2-5,000 ±31.6%	WESTON MODEL 301 ONLY	"	"	"	13	29-52	"	89.08
"	3.1%	30-300 ±8.15%	10-1,000 ±11.9%	2-5,000 ±31.7%	JEWELL PATTERN 54 ONLY	"	"	"	15.4	35-62	"	88.08
1,000	1.25%	300-3,000 ±6.3%	100-10,000 ±10.1%	20-50,000 ±29.9%	WESTON MODEL 301 ONLY	1	"	"	41.5	75-150	"	973.0
"	1.3%	300-3,000 ±6.35%	"	"	JEWELL PATTERN 88 ONLY	"	"	"	46	104-184	"	971.0
"	1.35%	300-3,000 ±6.4%	100-10,000 ±10.2%	20-50,000 ±30%	JEWELL PATTERN 54 ONLY	"	"	"	53.85	121-215	"	967.5
"	3.8%	300-3,000 ±8.85%	100-10,000 ±12.6%	20-50,000 ±32.4%	WESTON MODEL 301 ONLY	10	"	15. NOTE 7	13	29-52	"	929.5
"	"	"	"	"	JEWELL PATTERN 88 ONLY	"	"	"	10.8	25-44	"	930.5
"	"	"	"	"	JEWELL PATTERN 54 ONLY	"	"	"	15.4	35-62	"	928.4
10,000	1.05%	3,000-30,000 ±6.1%	1,000-100,000 ±9.9%	200-500,000 ±29.7%	WESTON MODEL 301 ONLY	1	"	"	41.5	75-150	"	9,878
"	1.06%	3,000-30,000 ±6.11%	"	"	JEWELL PATTERN 88 ONLY	"	"	"	46	104-184	"	9,876
"	"	"	"	"	JEWELL PATTERN 54 ONLY	"	"	"	53.85	121-215	"	9,872
100,000	0.64%	30,000-300,000 ±5.69%	10,000-1 MEGOHM ±9.5%	2,000-5 MEGOHMS ±29.2%	WESTON MODEL 301 ONLY	200 MICRO-AMPERES	"	30. NOTE 9	75	200-350	"	99,700
"	0.9%	30,000-300,000 ±5.95%	10,000-1 MEGOHM ±9.7%	2,000-5 MEGOHMS ±29.5%	"	1	"	150. NOTE 10	41.5	75-150	"	99,200
"	"	"	"	"	JEWELL PATTERN 88 ONLY	"	"	"	46	104-184	"	"
"	"	"	"	"	JEWELL PATTERN 54 ONLY	"	"	"	53.85	121-215	"	"
1 MEGOHM	0.6%	300,000-3 MEGOHMS ±5.65%	100,000-10 MEGOHMS ±9.4%	20,000-50 MEGOHMS ±29.2%	WESTON MODEL 301 ONLY	200 MICRO-AMPERES	"	300. NOTE 10	75	200-350	"	998,000

NOTE 1: TO OBTAIN ACCURATE READINGS AT THE LOW END OF THESE RANGES, THE WIRES SHOWN BY HEAVY LINES IN THE DIAGRAM SHOULD BE THREE #14 "BUSS" WIRES TWISTED TOGETHER OR SIMULAR, AND TEST LEADS SHOULD BE OF LIKE SIZE.

NOTE 2: USE TWO #6 DRY CELLS IN PARALLEL (WILL GIVE 4 OR 5 TIMES THE SERVICE OF A SINGLE CELL).

NOTE 3: USE ONE #6 DRY CELL (BECAUSE OF IT'S LOW RESISTANCE).

NOTE 4: USE ONE #2 (REGULAR SIZE) FLASH LIGHT CELL.

NOTE 5: USE TWO #2 (REGULAR SIZE) FLASH LIGHT CELLS OR THE 3 VOLT TAP OF A 4½ VOLT "C" BATTERY.

NOTE 6: USE 4½ VOLT "C" BATTERY.

NOTE 7: USE TWO BURGESS #5540-7½ VOLT "C" BATTERIES.

NOTE 8: USE #6 DRY CELL WITH R_{FC} AS SHOWN; OR USE #2 (REGULAR SIZE) FLASHLIGHT CELL AND SUBSTRACT 2.6 OHMS FROM R_{FC} (WILL INCREASE THE ERRORS 2.5% BUT WILL BE MORE PORTABLE).

NOTE 9: USE ONE BURGESS #5540-7½ V."C" AND ONE #5156-22½V. "C" BATT.

NOTE 10: USE MEDIUM SIZE "B" BATTERIES AND 4½ V. "C" BATTERIES (SUITABLE FOR BENCH USE ONLY).

FIG. 2

A.R.Gray

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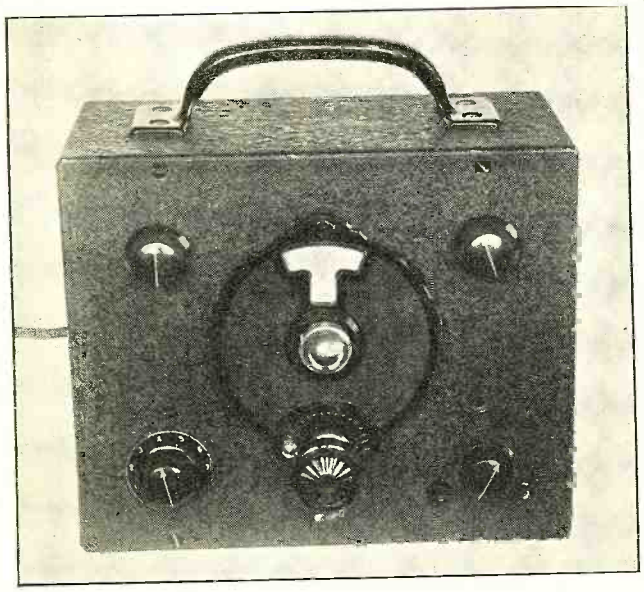
RADIO NEWS SERVICE INSTRUMENTS—No. 4



A 100—22,000 kc.

SIGNAL GENERATOR

This service unit, which can be readily built by the serviceman, provides: variable modulation percentage, variable tone, output attenuation, handy carrying size, a.c.-d.c. line operation, and extreme stability in operation

John H. Potts

UNTIL recently, the majority of good signal generators designed for radio service work have been battery-operated. Such instruments must of necessity use fragile, filament-type tubes and require frequent battery replacement to hold calibration. As a result, there has been an insistent demand for a good line-operated device of this type, sufficiently rugged in design to withstand the hard usage to which a service instrument is subjected, yet capable of maintaining calibration over the extreme ranges of line voltage variation likely to be encountered.

The popularity of the all-wave receiver, with low image-frequency selectivity on the short-wave bands, makes it necessary that the instrument cover all bands on fundamental frequencies. Increased efficiency of modern a.v.c. circuits requires a high degree of attenuation control of the signal generator output. Some methods of aligning sets require an unmodulated signal which is likewise valuable for many tests of component parts.

In the apparatus to be described, an electron-coupled, high-C circuit of extraordinary stability maintains calibration exact to within 1/20 of 1 percent on either a.c. or d.c. over a line voltage variation of more than 20 volts. The percentage modulation may be varied from 0 to approximately 100 percent. The modulation frequency may also be varied over a portion of the audio range and, if desired, an external beat-frequency oscillator may be used for modulation in testing high-fidelity receivers. The attenuator, usually the weak spot of a.c.-d.c. signal generators, is an original design which, while simple and inexpensive, provides exceptionally effective attenuation at even the highest frequencies. The range of the instrument extends from below 100 kc. to above 22,000 kc. with adequate overlap between bands. A pilot light provides brilliant illumination of the dial calibrations, reducing eye-strain and giving an instant indication of filament circuit continuity. The National vernier dial operates without backlash and is provided with a convenient means of regulating the vernier ratio. The metal case, manufactured especially for this instrument by the National Company, is finished in durable crackle enamel. All joints are welded, providing a highly effective shield. The metal handle is manifestly an improvement over the usual leather strap. The case, exclusive of the handle, measures but 8¾ by 7 by 4 inches, making the instrument probably the most compact of equivalent perform-

BASIC AND FINAL CIRCUITS

The fundamental circuit employed to study the practical possibilities of the 6A7 tube for use as a combination r.f. oscillator and audio modulator; and of a special type miniature neon lamp as a stable audio-frequency oscillator. Both proved highly successful in these applications, and were therefore adopted for use in the final circuit as shown in Figure 2

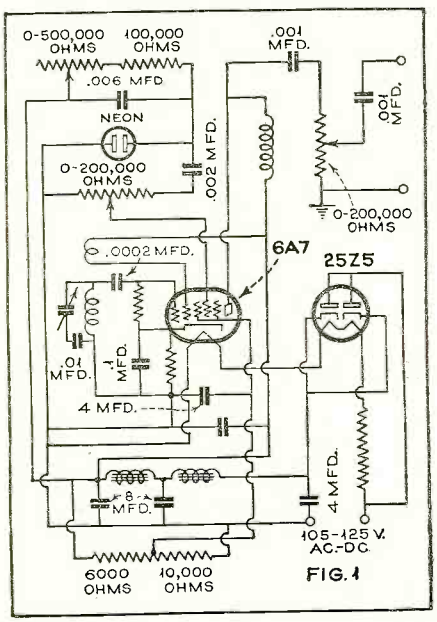


FIG. 1

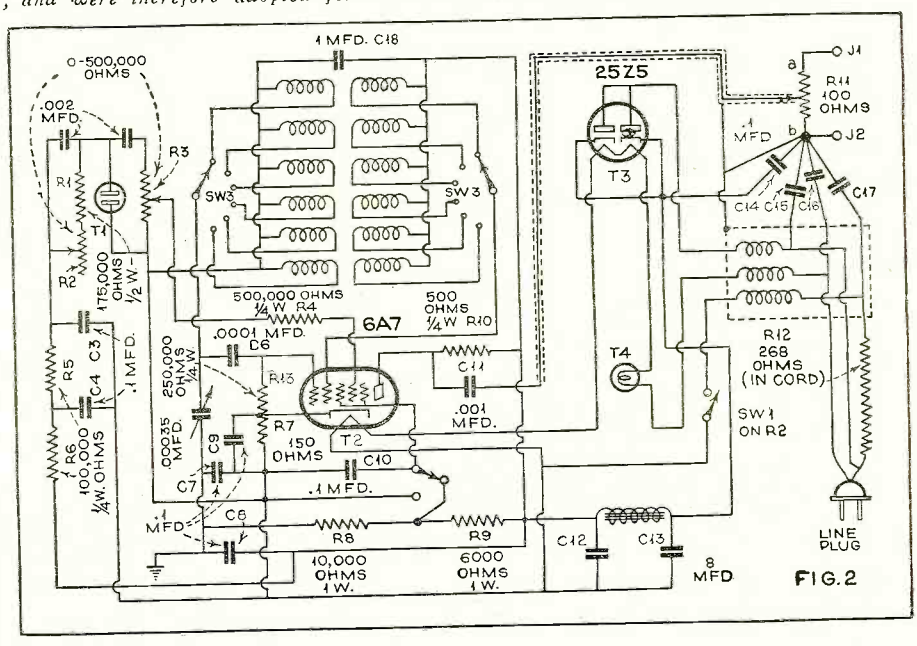


FIG. 2

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ance, offered to date for experimenters.

Over a year ago the technical staff of RADIO NEWS started an experimental investigation of the 6A7 to determine its suitability for modulated oscillator use in conjunction with a neon tube to supply the modulation voltage. The original circuit is shown in Figure 1.

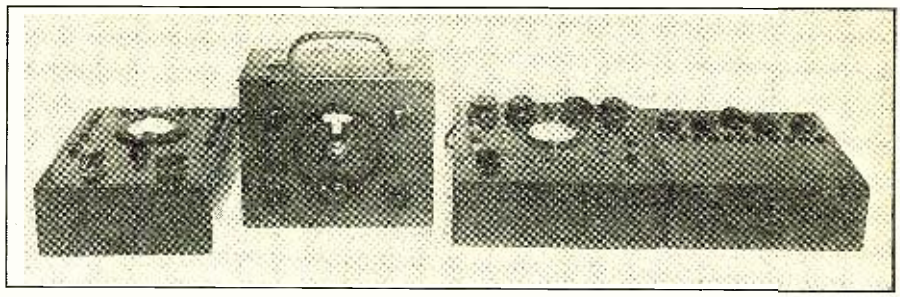
Fundamentally, this circuit shows an a.c.-d.c., line-operated, modulated oscillator, a 6A7 pentagrid converter being used in an electron-coupled converter circuit, but with the modulation voltage applied to the usual signal control grid, a special neon tube acting as audio oscillator, variation of audio voltage applied to the control grid of the 6A7 produces a corresponding variation in the modulation percentage. Variation of the voltage and constants of the neon circuit produce a change in the audio frequency. A 25Z5 rectifier in a conventional half-wave filter circuit supplies good voltage regulation of the B power and reduces the amount of heat to be dissipated in the power cord series resistance, which would be appreciably increased if the usual 6.3-volt rectifier were used.

With the soundness of the fundamental idea demonstrated, the task of developing this circuit and adapting it to a thoroughly practical, compact, inexpensive signal generator suitable for service work was assigned to the writer. The use of special parts has been avoided and constructional details have been made as simple as possible. In the actual wiring, care must be taken to follow directions in the placing of some of the connections and apparatus, but there are no serious constructional difficulties.

A number of modifications of the experimental circuit were made. The revised circuit, with changes incorporated, is shown in Figure 2. This may seem rather complicated at first glance, but is really simple. Let us consider the 6A7 as a composite of two tubes, a triode r.f. oscillator and a four-element a.f. amplifier, as employed in this circuit. These are shown in Figures 3A and 3B. The oscillator circuit will be at once recognized as the reliable tickler feed-back circuit, with G1, the grid nearest the cathode, acting as control grid, and G2, immediately adjacent, serving as anode grid, or plate. In Figure 3B, the output voltage of the choke and condenser filter circuit of the 25Z5 is applied to the resistance-capacity filter composed of R6-C4 and R5-C3, which smooths out the residual hum of the half-wave rectifier, thence to the audio-frequency control circuit composed of R2, R1 and C1. Variation of R2 changes the voltage applied to the neon tube and also the time constant of the resistance-capacity circuit, thus varying the oscillation period of the neon tube. The resulting a.f. voltage is applied across R3, d.c. being blocked from the grid by C6. With the slider at point A, no audio voltage is impressed on G4, and none appears in the plate circuit. With the slider at point B, the voltage applied to G4 is a maximum, limited by R4 and the input resistance of the tube. Combining electronically with the r.f. voltage developed in the circuit of 3A, variable modulation percentage is secured without loading the r.f. oscillator directly.

R4, in series with the control grid, G4, serves to counteract many undesirable effects in oscillation over the high-frequency bands and to facilitate operation with such a high tuning ratio, in the megacycle ranges. R4 also serves to minimize any slight frequency shift resulting from applying too high voltage to G4. If it is desired to go above 22 megacycles, G2, G3 and G5 may be paralleled, affording higher feed-back voltage with less tickler, and thereby enabling the tube to operate at higher frequencies. Since this would involve the construction of an additional coil and a different method of attenuation, this system was not used in this design.

The attenuator circuit is shown in Figure 4. The output of the 6A7 is fed through the condenser, C11, and the shielded lead to the moving arm of the 100-ohm potentiometer, R11. The shielding over the lead is insulated from the signal generator case. A single point r.f. ground is established at the output terminal, J2, likewise insulated from the case, to which the lead shielding and line filter shield are connected. The lead from point *b* of the potentiometer to J2 is very short, likewise all leads from the line filter by-pass condensers and (*Continued on page 522*)



The RADIO NEWS Service Instruments

THE signal generator described here is the fourth instrument designed by the author, in collaboration with the RADIO NEWS Laboratory, and described for the benefit of servicemen who prefer to construct their own equipment. For those who may have missed the earlier articles, they were: *A Portable Tube Checker,* July, 1934; *Universal Multimeter,* August and September, 1934; *All-Method Analyzer,* October, 1934. Following completion of the series on portable equipment a number of shop or laboratory instruments will be developed so that this series of articles will, upon conclusion, provide comprehensive construction data on every type of instrument required in a modern radio service business.

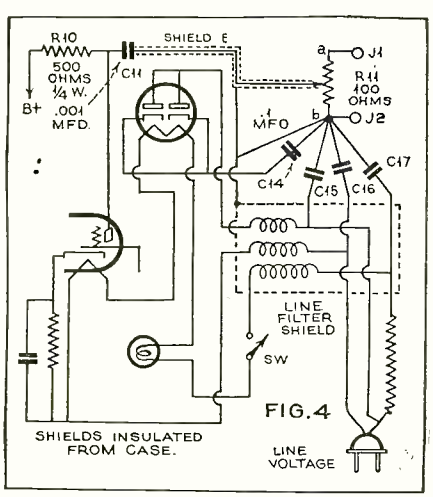


FIG. 4

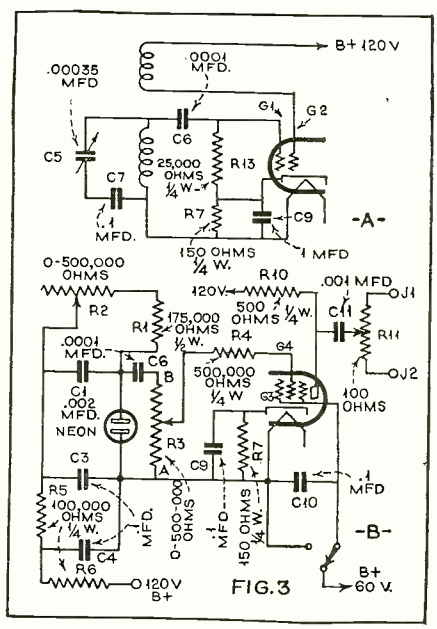


FIG. 3

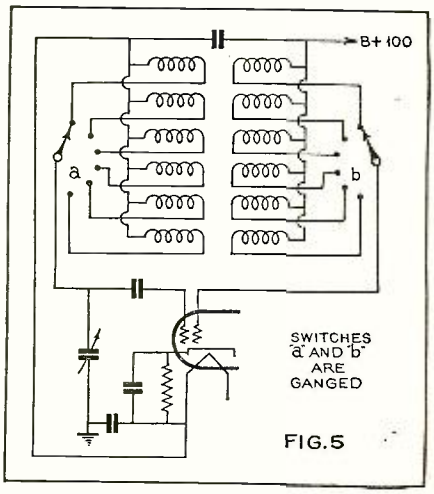


FIG. 5

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Variable Resistors for SENSITIVITY *and* VOLUME CONTROL

No matter how simple the customary resistance controls may look, it requires extensive research and thought for most effective application. The author gives valuable pointers concerning their use

L. A. de Rosa

PUZZLING PROBLEM SOLVED

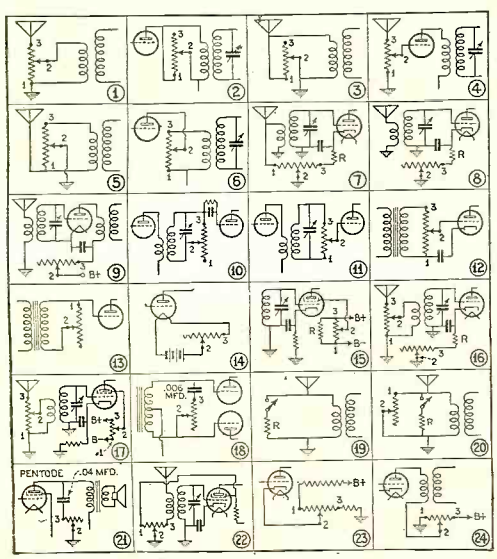
The correct value to be used for resistance controls has always puzzled experimenters, and this article throws light on the subject

AN inhabitant of one of New York's apartment houses once defined a volume control as "a knob on my radio receiver which enables me to hear my set when the 223 other radio receivers in the building are going." That, indeed, is a sufficient description for the layman, but to the perturbed amateur seeking vainly to select a type to serve his particular need—well, the description is a bit vague. This article will explain which types of controls are best suited for attenuating the signal at different points in the circuit, and what resistance distribution and overall values are most desirable.

IN receivers using a manual sensitivity control, the signal attenuation is usually accomplished by one (and sometimes two) circuit arrangements as shown in the accompanying group of schematic diagrams. No matter which method is used, several considerations are involved. First, the control must be capable of reducing the signal output on the most powerful local station to an almost inaudible level. This requires that the control, if used as a potentiometer, (Circuits 1, 4, 5, etc.), or a shunting resistance (Circuits 2, 3, 10 etc.) have a completely "off" position, that is, with the slider set at zero, no "pickoff" resistance.

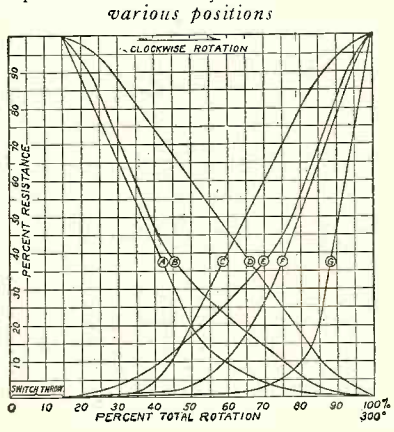
If the control is used as a series variable resistance (varying the tube constants, as in circuits 8 and 9, the overall value of resistance must be enough to reduce the mutual conductance of the tube sufficiently to lower the amplification to a desired value. This can be done by increasing the negative grid bias (Circuit 8), decreasing the screen grid voltage (Circuit 15), decreasing the plate voltage (Circuit 9), or decreasing the filament voltage (Circuit 14). Frequently, in receivers having a high sensitivity, and not employing variable mu tubes, it is found necessary to use a compound-control.

This is necessary because for ordinary screen-grid tubes the mutual conductance-grid bias, or mutual conductance-screen voltage curves have a sharp cut-off for low values of mutual conductance. Since for power locals, in securing the huge attenuation necessary (which is a maximum near this sharp cut-off point), distortion is introduced. The effect is to allow the peaks of the modulated wave to burst through relatively unattenuated while the troughs of modulation are greatly attenuated.



CORRECT "TAPER" TYPES

At the left are shown 24 fundamental resistance-control circuits, while below are the types of tapers recommended for use in these various positions



Compound controls consist of a unit to vary the mutual conductance of the r.f. tubes and a unit (usually on the same shaft) to reduce the antenna input for powerful local signals. These types are generally most satisfactory.

A primary consideration in selecting the control position is that at no volume level must the input to any r.f. or detector tube be great enough to overload it, and thus introduce distortion. Another consideration is that the selectivity and overall fidelity must be affected as little as possible. Generally, controls that attenuate the r.f. input affect either the selectivity by damping the tuned circuit, or the tuning by varying either the capacitive or inductive reactances.

The technicalities of the design of r.f. input attenuators are quite involved. However, any of the r.f. attenuating circuits shown in Circuits 1 to 24 will suffice, especially in receivers having a medium sensitivity.

Resistors employing different degrees of taper are required for different applications. A wide variety of taper arrangements is available on the market, some idea of which is obtained from the group of curves shown herewith which cover stock items in the Electrad line.

As the volume of a receiver is reduced, the lower frequencies reproduced seem to drop off more rapidly than the higher frequencies. This phenomenon is due to a peculiarity of the ear and produces the well-known "tinny" effect at low volumes. Therefore it is desirable that the volume control contain an auxiliary arrangement to cut off some of the high frequency energy at low intensity levels. If this is not possible at least the control must not have the effect of decreasing the low frequency response at low levels, such as the result of varying the grid circuit resistance in a (*Continued on page* 524)

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FIRST AID *to* INVENTORS

(Protecting Your Rights)

This is the fourth of the series of articles written exclusively for RADIO NEWS readers explaining little-known facts about patents. The subject this month is "How Not to Give Away Your Invention"

E. E. Free, Ph.D.

Part Four

WRITES THIS SERIES FOR YOU

A recent photograph of Dr. E. E. Free, well-known consulting physicist and expert in acoustics. The author of this series speaks out plainly, about patents, from many years of experience

IN an earlier article of this series I expressed my conviction that very few inventions are stolen, either by the "great corporations" or by anybody. The real danger of inexperienced inventors is to waste money on something commercially worthless. Another danger is that of accidentally giving away an invention, valuable or otherwise, through carelessness or ignorance of the law.

ONE way to virtually "give away" an invention is to be unable to prove the date of your invention in case someone else invents the same thing at about the same time. Another is to give your rights to the public without realizing that you are doing so. The first often involves what technically is called an "interference." During the examination of your patent application by the Patent Office, as described in the previous article of this series, the examiners of that office may find on file there (at the same time) another patent application covering the same or nearly the same ground. One obvious thing to do would be to accept the patent application filed first and reject the other one, but this might not be really just and is not done. Instead, the Patent Office formally declares an interference between the two applications and permits each inventor to submit argument as to whether or not the two inventions really are the same and also evidence concerning the date at which each of the claimed inventions was conceived.

If there really is an interference between the two inventions, the rule of law is that the invention first clearly conceived and understood by its inventor is entitled to the patent, not necessarily the one covered by the first of the interfering applications to be filed. Although sometimes criticized, this rule seems, on the whole, to be just and reasonable. Certainly it is a powerful protection to the actual inventor against unscrupulous persons who might hear of his invention accidentally and rush an earlier application into the Patent Office before the real inventor was ready to file his own.

This rule makes possible the policy advocated in a previous article of being certain that an invention really is valuable before considering a patent, for which delay there are two excellent reasons. One is the avoidance of expense on worthless ideas. The other, often still more important, is that time thus is given for careful laboratory and commercial study of all phases of the invention before the application is filed. Items desirable to include in the application are less likely to be overlooked. The patent finally obtained is likely to be stronger and more comprehensive.

It has been my experience that the majority of interferences in the Patent Office are unquestionably legitimate. At any specified time a number of new inventions might be said to be "in the air." Years ago, when I was helping to edit a magazine, we received one week, from two authors both well known to us, two manuscripts on identical subjects, treated in almost identical ways. This did not mean that either author had stolen the other's idea. It was merely that the subject which both discussed was active just then in the public mind. The way in which both of them treated it was the logical one for a person of scientific training, which both authors were. The only thing for the editor to do was to declare a mental interference and buy the manuscript he liked the better.

WHERE COPIES ARE MADE

This is the Manuscript and Lithography Department of the Patent Office, where authentic copies of patents are made for permanent filing

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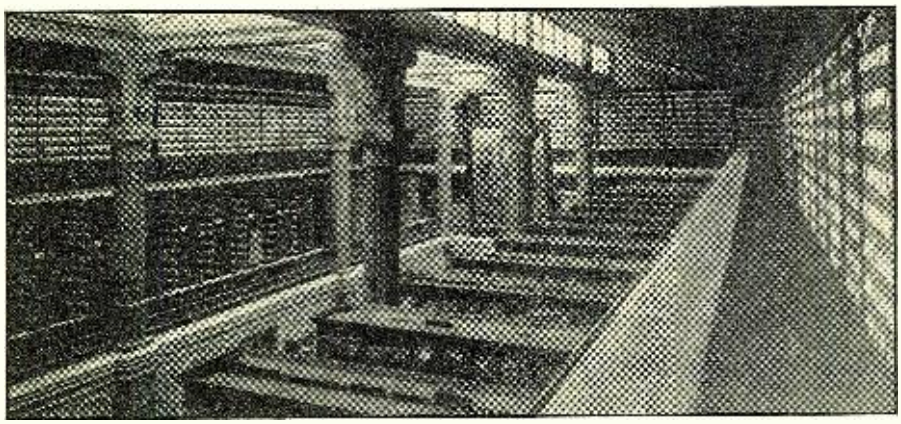


MILLIONS OF INVENTIONS THAT WERE GIVEN AWAY!

Here is a section of the U. S. Patent Office Building, showing files containing millions of patents that were abandoned, the inventions becoming public property

Every year sees numerous such instances among inventions. A few months ago my organization received, in one week, three separate proposals concerning automatic devices for remote tuning of radio receivers. For months after the Lindbergh kidnapping case, all laboratories such as ours were deluged with ideas for automatic window, nursery and baby-crib alarms to prevent such happenings. Human minds all are much alike. Any prominent incident in the news is sure to start scores of them to working on what amounts to much the same invention.

It still is possible, of course, that some interferences may be fraudulent or may savor of sharp practices. I have heard of instances in which someone visiting an inventor's laboratory kept his eyes open and filed (next week in the Patent Office) applications extremely close to things on which his late host had been at work. The safeguard is that this does not much matter.

The rule of the Patent Office to respect the date of invention more than the date of filing is a firm protection to the real inventor—provided he still is able to prove that date.

Here arises the great importance of comprehensive, dated notes and similar documents. Every experimenter, whether or not he intends to patent anything, should keep neat, complete and dated records of everything he does and of how it comes out. Preferably, these are kept in some substantial kind of notebook, the leaves of which are bound in permanently, like an old-fashioned ledger. Such note-keeping is taught in all proper scientific schools, although sometimes forgotten, alas, by busy scientific practitioners.

The master note keeper of them all was also our master experimenter Michael Faraday. A dip into Faraday's notebooks, some of which now have been printed and published, should be required reading for every would-be inventor or experimenter.

Whenever possible, such daily, dated notes of ideas conceived and experiments tried should be accompanied by sketches or more elaborate drawings. It is not necessary to be lengthy or verbose but it is necessary to be exact, especially about facts. Precisely what did you think of. Exactly what did you do? Just how did this experiment come out? Many highly-important patent suits have turned on just such careful, day-by-day records.

Remember that your notebook may appear in court some day for the inspection of a skeptical judge or of hostile expert witnesses. Write your daily notes with that ordeal in mind.

There is, however, one inescapable weakness of the laboratory notebook. It is possible for it to be a forgery. Even if the notes themselves are genuine, the dates may be forged or altered. Hence the inventor should be prepared to prove the date of an important invention by some kind of entirely independent evidence which no one can accuse him of having manufactured. There are three more or less standard ways to do this; a dated statement signed by witnesses, a certificate by a notary public, and a registered letter mailed to one's self and left unopened.

It would be foolish to resort to these expedients with each day's routine laboratory notes. My own practice, and I imagine the practice of most experimenters, is to make such special records only when one seems to have discovered or invented something apparently of real importance.

When this happens, the usual practice is to write out, independent of the laboratory notes, a complete statement of the invention, much as it might be prepared for submission to a patent attorney. This then is given to several trustworthy friends or laboratory associates, each of whom reads it and endorses the document with his name and the date. The usual form is "Explained to and understood by me," adding the day, month and year and the witness's signature.

The notarial certificate is made similarly except that the notary merely witnesses the signature of the inventor to the document or the signatures of one or more other witnesses, dates these, and affixes the legal notarial seal. Since notaries are public officials under oath not to date documents falsely, such evidence of date usually is accepted by the courts.

The third procedure is to place a signed copy of a description of the invention in an envelope and mail it to yourself by registered mail. The date of mailing then becomes a record of the United States Post Office, attested by the postmark. If the envelope when received is preserved but left unopened, it is available as later proof that the document inside it was in existence on the postmarked date.

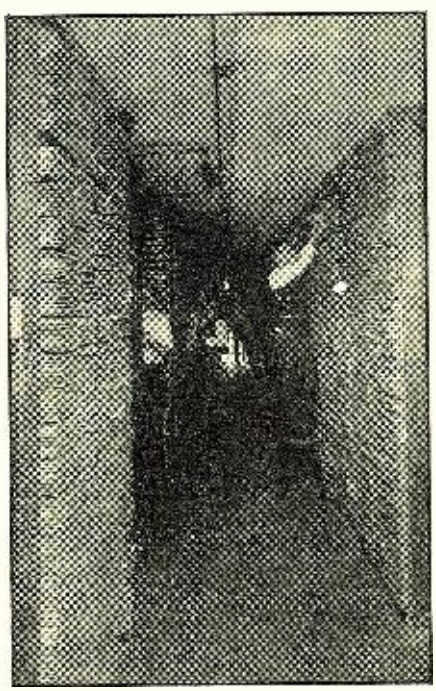
None of these expedients establishes with certainty the date of an invention. They merely are evidence. All may need to be supported in court or elsewhere by actual testimony of the witnesses who signed the document, of the notary or of the Post Office officials. Good laboratory notes are the first essential. Beyond that, my own practice is to rely on a complete written statement witnessed by a notary. This avoids troubling one's friends to read, understand and sign anything and probably is just as safe. In matters of extreme importance, I sometimes ask laboratory associates to witness statements or laboratory notes.

The importance of the date of invention may extend to later dates at which secondary features of an invention were developed or to dates at which ideas involved in the invention were reduced to practice and found to work successfully. Also, the importance of these dates by no means ceases with the issuance of the patent. An issued patent may be attacked at any time. The whole file of dates, notes and other documents must be preserved so long as the patent is in force.

Patent litigation usually involves one or more of three contentions; that the patent is being infringed, that it is invalid or that it was anticipated. Infringement means that the owner of a patent claims that someone else is using the (*Continued on page* 521)

FILING PATENTS

Here are some of the members of the United States Patent Staff, busy filing new patents in the Patent Office



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RADIO *in* AIRCRAFT

(Servicing Receivers)

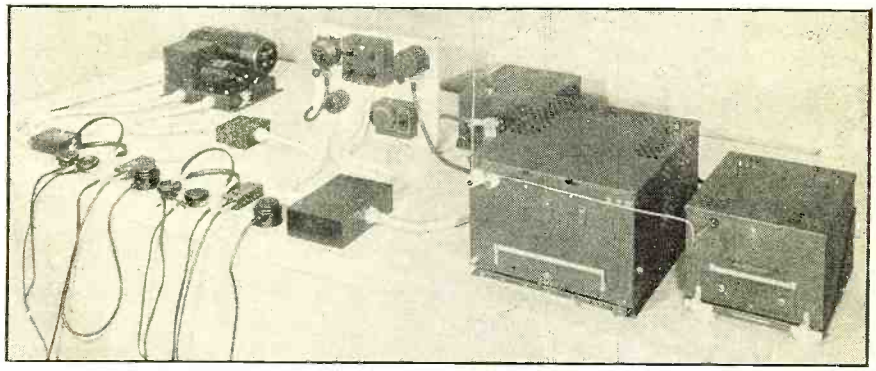
Henry W. Roberts

Part Three

IN the two preceding installments of this series the author discussed fundamentals of aircraft radio installation, particularly as applying to receivers. In this article he deals with what is probably the most important phase to the radio man—servicing aircraft radio.

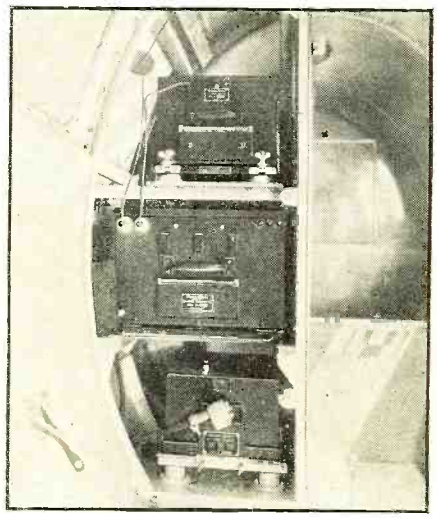
BECAUSE aircraft radio is operated under conditions of constant vibration and take-off and landing shocks, considerable inspection and maintenance work are required on all installations. As an airplane is normally given a check-up every 20 flying hours, the radioman should arrange to have his own inspections coincide with these periods. Airplanes are also periodically overhauled, usually being given a "top" overhaul every 100 hours or less; and a "major" overhaul about every 300 hours. These overhaul periods (when the airplane is taken out of commission) should be utilized by the radioman for overhauling the radio apparatus, thus sparing the owner annoying delays and needless expense.

An aircraft radio installation consists of a number of commercially manufactured units, grouped to perform a certain specific service under certain specific conditions. The units themselves have been designed to withstand the rigors of airplane operation, and are not likely to require much more servicing than any other type of radio; however, they must be carefully checked each time and inspected for indications of possible failure of soldered connections, or parts, such as tubes, etc. Instructions for servicing such commercial units are generally available from their respective manufacturers, and it is not the purpose of this article to discuss this particular aspect of servicing.



AIRCRAFT RADIO EQUIPMENT

The illustration above shows the complete radio telephone equipment for transport planes made by Western Electric, including the power unit, the control units, the long-wave or beacon receiver, the short-wave transmitter, and the short-wave receiver. Below: How this equipment looks when installed in the plane.



The greatest number of failures in aircraft radio, however, will be found in the installation proper, i.e.: antenna and counterpoise systems, shielding and bonding work, connections between units, mounting, fittings, accessories, and the like; practical knowledge of where to look for trouble, and how to remedy it, is essential to the aircraft radioman.

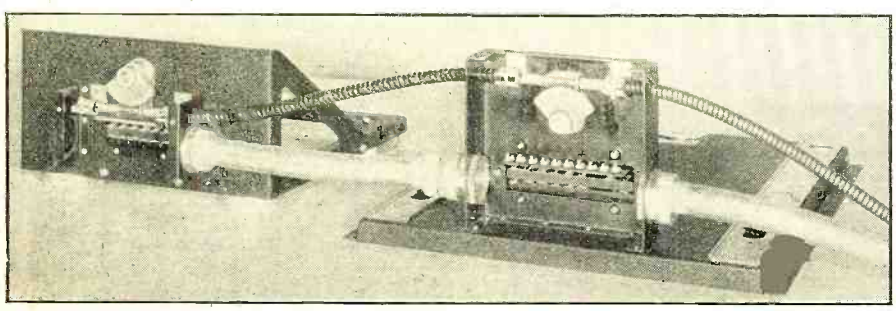
The important thing to remember in servicing aircraft radio is *not to wait until a failure occurs*, but to keep the apparatus in top-notch condition at all times. An airplane "flying blind" relies *solely on radio* to bring it to its destination, and the whole array of dials on the instrument board cannot tell the pilot just where he is, once his radio goes out of commission. The consequences of radio failure at such a time may be very grave—and even though you may not care about the pilot personally, it is *bad business to lose a customer!*

Thus, it is seen that most of the routine aircraft radio service will consist chiefly of inspection and *preventative* servicing, rather than actual repair work. The importance of these inspections, while self-evident, must sometimes be brought to the attention of some recalcitrant owners, and in so doing the serviceman acts in *their* interests far more than in his own.

Figure 1 illustrates a typical schematic layout of a complete two-way radio installation, employing one transmitter and two receivers (one for low frequencies, used for beacon and Federal weather broadcasts; the other, operating in a higher-frequency band, for use in commercial aircraft channels). While such complete installations are found mostly in airliners, a less elaborate installation, likely to be encountered in a private airplane, will follow the same general layout, and the chart will be equally valuable for proper understanding of the first service problem: *correct correlation of units.*

REMOTE-CONTROL UNITS

Two W. E. unit mountings for radio-telephone plane equipment (short-wave receiver mounting on left and short-wave transmitter, on right), showing the power plugs, conduit and the worm controls attached to the flexible shaft running to the pilot's cockpit.



To service a radio installation intelligently, one must first ascertain what component units comprise the installation. If the serviceman did not make the installation which he is called upon to service, his first duty is to familiarize himself thoroughly with its peculiarities, and verify to his own satisfaction that the original job was well done.

Most airplane owners find it expedient to have their radio apparatus serviced always by the *same* man—at the *same* airport—and if there is a chance of adding the pilot to your permanent customers, it is well to make a layout drawing of the installation in his ship, similar to that shown in Figure 1, which will greatly facilitate servicing. Should the pilot become a permanent customer, the serviceman will find it worth his while to make a complete wiring diagram of the installation—at least, all available color coding should be noted. (*Continued on page* 516)

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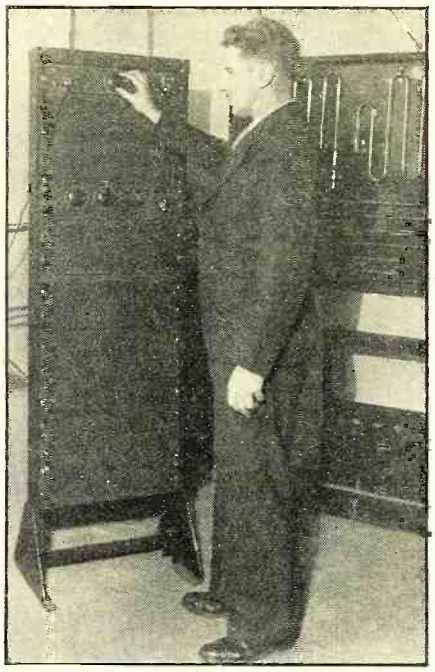
A New RACK *and* PANEL AMPLIFIER

Many servicemen and others interested in public address work will welcome this description of a complete panel type amplifier with the necessary changeable racks to adapt it to a number of specific uses in this work

B. J. Montyn

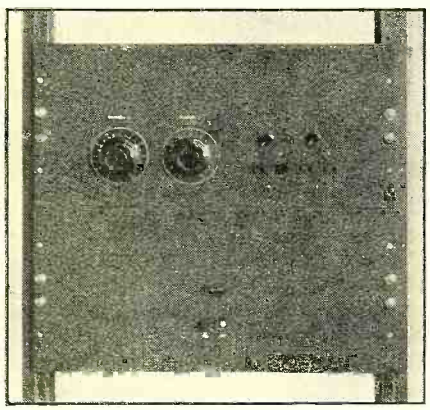


PUBLIC-ADDRESS amplifiers can now be constructed so well that very good quality is obtainable with relatively low-cost apparatus. Here is shown such an amplifier, complete with rack, panels and everything, obtainable in kit form and which can be put together by the serviceman.

The complete amplifier consists of a pre-amplifier, main amplifier, and powerpack. Moreover, all other accessories, such as the rack, a phonograph shelf equipped with a pickup and a tuner are being made available. The main amplifier consists of three stages of transformer-coupled and impedance-coupled amplification, all being push-pull (see Figure 1). The output stage can be one pair of type –45 tubes in a Class A prime (Class AB) circuit. This stage will deliver 18 watts of power with less than 5 per cent total harmonic distortion. For those who wish more power, two more type –45 tubes can be added, making it a parallel-push-pull stage and doubling the power. The only change and expense for this additional power are the two tubes, the sockets and a different output transformer; the rest of the circuit remains the same. The gain of this amplifier is 80 d.b. and the frequency characteristic is shown in Figure 3. The rating of this amplifier is conservative and is in agreement with the ratings given by the tube manufacturers in their engineering Bulletins. Special precautions have been taken to insure low-distortion percentage and absence of microphonics. All the voltage-amplifier tubes have sockets equipped with springs to minimize microphonism. The output stage has a fixed bias which is the method recommended for maximum power and minimum distortion.

It is, of course, necessary to have a power supply with good regulation, because the plate current for each –45 tube is only 22 m.a. with no signal, but increases to 70 m.a. for full output. This also explains why self-biasing is not used. The power supply (Figure 1) has been designed to take care of this requirement. The mercury-vapor rectifier has a low, internal voltage-drop which helps to maintain the voltage when more current is drawn. Note the extra type –82 tube which supplies the bias to the type –45 tubes.

The input to the main amplifier consists of two 500-ohm lines or two 200-ohm lines. Each line is connected to a d.p.d.t. switch. (*Continued on page* 523)



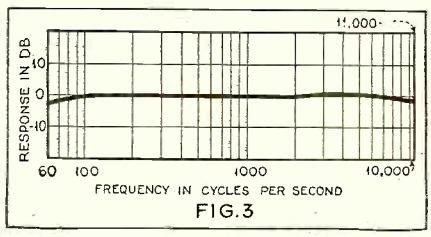
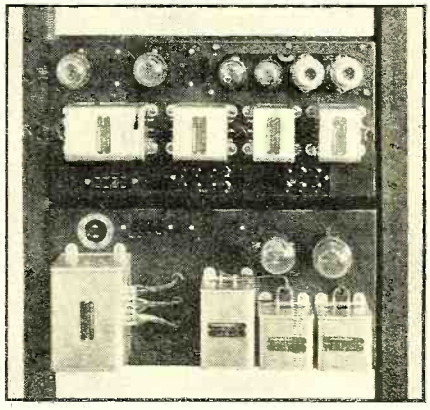
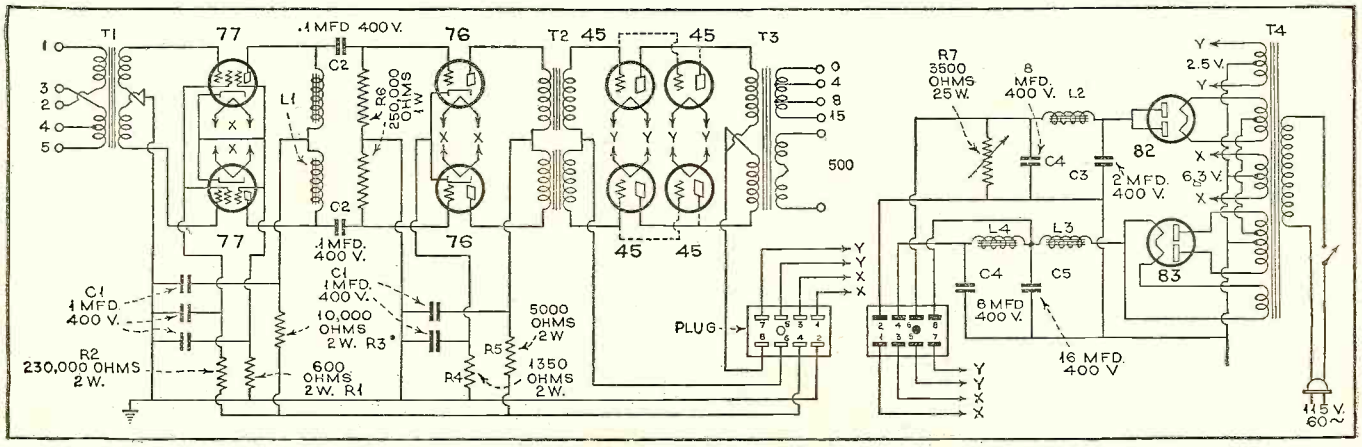


FIG. 3



BELOW, FIGURE 1



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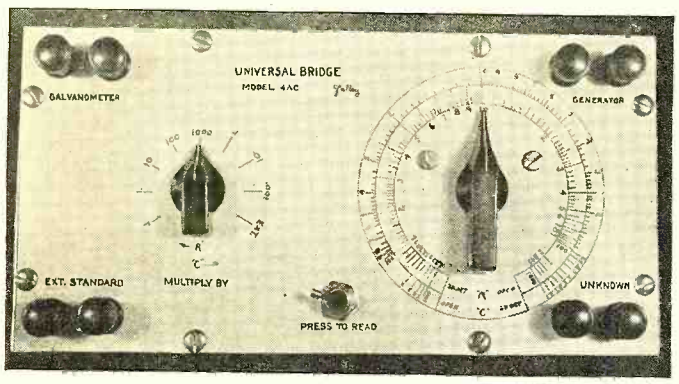


THE CONTROL PANEL

The range selector at the left, and the large pointer at the right with its direct reading capacity and resistance scales, make this bridge simple in operation

Direct-Reading SLIDE-WIRE BRIDGE

Gerard J. Kelley

THERE are very few men engaged in radio who at some time or other have not wished to have a bridge handy. A bridge is an instrument which allows an unknown unit to be measured in terms of a known value. In Figure 1 is shown a network composed of two branch circuits each containing two separate variable resistances connected in series and the two branch arms are connected in parallel across the battery. At the point of junction between R1 and R2 in arm A one side of a voltmeter is connected. The other side is connected to the similar point between R3 and R4 in arm B.

When one of the four resistors is variable, it can be so adjusted that there is no voltage difference between the two aforementioned junctions and the indicating meter reads zero. The bridge is then said to be balanced.

When balance is reached, the value of one resistor can be computed if the value of the other three is known. This is expressed by:

$$R4 = R3 \times R2 \div R1$$

This form of bridge requires three separate known resistance groups. R1 may be a fixed value; R2, a group of resistances, 10, 100 and 1000 times greater or less than R1; and R3 a decade-box, variable in steps of 10 ohms up to 1000 ohms. The accuracy of useful measurement is dependent upon the accuracy of the three known resistances. In laboratory instruments these resistances are adjusted to 1/10 of 1 per cent, and, as there are a number of resistors this form of bridge is quite high in cost.

For general use in the experimenter's shop and service work there is no need of such extreme accuracy. For this purpose the simple inexpensive bridge described herein was designed. It may be used with a source of a.c. for measuring resistors and capacity, or with d.c. for measurement of resistors.

For a.c. measurements, the 60 cycle line, a telephone buzzer, a microphone hummer, or a vacuum tube oscillator may be used as a voltage source. To indicate balance, a pair of phones, a copper oxide volt- or current-meter, or an audio amplifier may be employed. In order to secure the greatest sensitivity of a copper oxide (rectifier type) voltmeter may be connected in the output of an audio amplifier, as per Figure 2. For d.c. a battery of 1.5 to 9 volts is used as the voltage source, and a galvanometer or a volt-milliammeter with a polarity changing switch as shown in Figure 3.

This bridge depends upon the known standard arm R3 which consists of 1 per cent wire-wound resistors, and selected fixed condensers. Provision is made to allow an external standard to be used, such as higher resistance, or inductance. A series resistance may also be used here connected in series with the standard capacities to measure power factor. Balance is secured by varying the ratio between R1 and R2 and the value of the unknown is read directly from the calibrated scale. As the standards are in multiples of 10 the scale is calibrated to read: .01 to 100 times the standard in use. Resistance standards of 1, 10, 100, 1000, and 10,000 ohms give a (*Continued on page* 519)

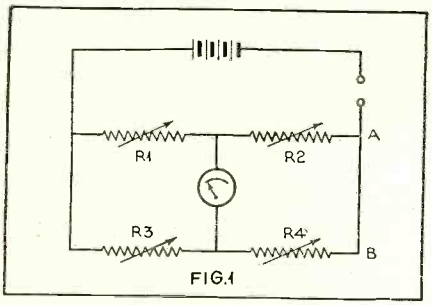


FIG. 1

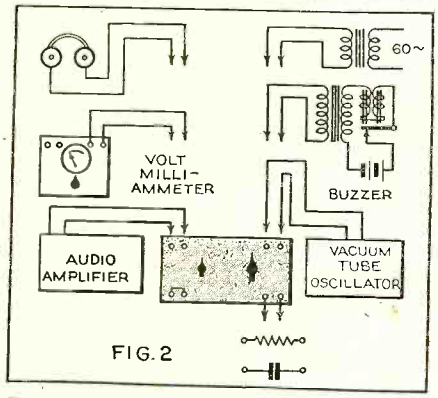


FIG. 2

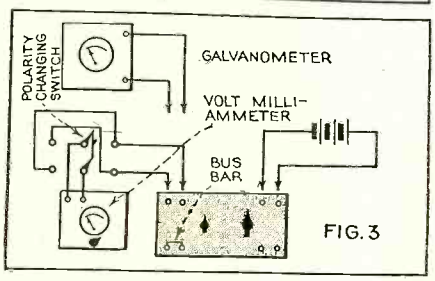


FIG. 3

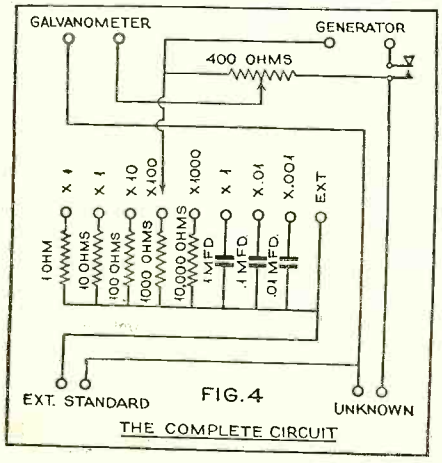
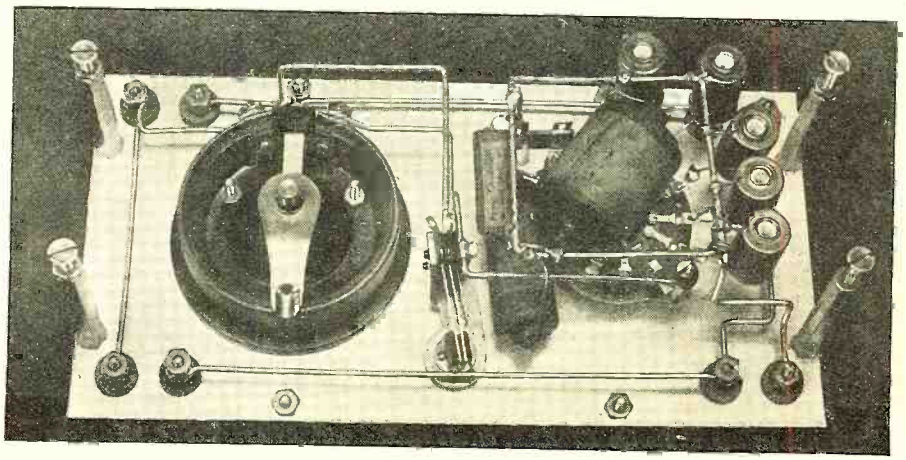


FIG. 4
THE COMPLETE CIRCUIT

THE "WORKS"

All parts are assembled directly on the metal panel. Note the large wire and firm connections employed to avoid errors in low-resistance measurements



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S.W. PIONEERS
Official RADIO NEWS Listening Post Observers

LISTED below by States are the Official RADIO NEWS Short-Wave Listening Post Observers who are serving conscitiously in logging stations for the DX Corner:

United States of America:

Alabama, J. E. Brooks; Arkansas, Don Pryor, Jas. G. Moore; Arizona, Geo. Pasquale; California, E. G. DeHaven, C. H. Canning, O. I. Noda, E. S. Allen, A. E. Berger, Ralph Leavitt, Geo. C. Sholin, Wesley W. Loudon; Colorado, Wm. J. Vette, F. Erich Bruhn; Connecticut, Phillip Swanson, Geo. A. Smith, H. Kemp; District of Columbia, Douglas S. Catchim; Florida, Geo. H. Fletcher, E. M. Law, James F. Dechert; Georgia, James L. Davis, C. H. Armstrong, Guy R. Bigbee, John McCarley; Idaho, Bernard D. Starr, Lawrence Swenson; Illinois, Phillip Simmons, E. Bergeman, Robert L. Weber, Floyd Waters, Chas. A. Morrison; Indiana, Freeman C. Balph, J. R. Flannigan, Henry Spearing; Iowa, J. Harold Lindblom; Kansas, C. W. Bourne, Wm. Schumacher; Kentucky, Charles Miller, Wm. A. McAlister, Geo. Krebs; Louisiana, Roy W. Peyton; Maine, R. I. Keeler; Maryland, Howard Adams, Jr., James W. Smith, J. F. Fritsch; Massachusetts, Armand A. Boussy, J. Walter Bunnell, Harold K. Miller, Donald Smith, Elmer F. Orne, Arthur Hamilton, Roy Sanders; Michigan, Stewart R. Ruple; Minnesota, Dr. G. W. Twomey, M. Mickelson; Mississippi, Dr. J. P. Watson, Mrs. L. R. Ledbetter; Missouri, C. H. Long; Montana, Henry Dobrovalny; Nebraska, P. H. Clute, G. W. Renish, Jr., Harold Hansen; New Hampshire, P. C. Atwood, A. J. Mannix; New Jersey, William Dixon, R. H. Schiller, Wm. F. Buhl; New Mexico, G. K. Harrison; New York, Joseph M. Malast, Capt. Horace L. Hall, S. G. Taylor, John M. Borst, Wm. C. Dorf, R. Wright, I. H. Kattell, Donald E. Bame, Albert J. Leonhardt, Wm. Kochnlein, Edmore Melanson, H. S. Bradley; Nevada. Don H. Townsend, Jr.; North Carolina, H. O. Murdoch, Jr., W. C. Couch, E. Payson Mallard; Ohio, Oker Radio & Electric Shop, R. W. Evans, C. H. Skatzes, Donald W. Shields, Albert E. Emerson. Samuel J. Emerson, Clarence D. Hall; Oklahoma, H. L. Pribble, Robert Woods; Oregon, Virgil C. Tramp, James Haley. Geo. R. Johnson; Pennsylvania, Edward C. Lips, K. A. Staats, C. T. Sheaks, George Lilley, John A. Leininger, F. L. Stitzinger, Hen. F. Polm, Chas. Nick; South Carolina, Ben F. Goodlett, Edw. F. Bahan; South Dakota, Paul J. Mraz; Tennessee, Charles D. Moss, Adrian Smith; Texas, Heinie Johnson, Bryan Scott, John Stewart; Utah, Harold D. Nordeen; Vermont, Joseph M. Kelley, Eddie H. Davenport; Virginia, Gordon L. Rich, G. Hampton Allison, D. W. Parsons; Washington, A. D. Golden, Glenn E. Dubbe, Chas. G. Payne; West Virginia, Kenneth Boord, R. E. Sumner; Wisconsin, Willard M. Hardell, Walter A. Jasiorkowski; Wyoming, Dr. F. C. Naegeli.

Applications for Official Observers in the remaining States should be sent in immediately to the DX Corner.

S. W. TIME SCHEDULE

LAURENCE M. COCKADAY

THE 23rd installment of the DX Corner for Short Waves features the World Short-Wave Time-Table for 24-hour use all over the world. The list starts at 08 G. M. T., which is 3 a. m., E. S. T., and runs through 07 G. M. T., or 2 a. m., E. S. T., right around the clock. The Time-Table contains a list of short-wave stations, logged during the last month in the RADIO NEWS Westchester Listening Post (in our Editor's home), as well as at other Official RADIO NEWS Short-Wave Listening Posts throughout the world. It provides an hour-to-hour guide for short-wave fans, whether experienced or inexperienced. There is also included a List of Station Locations, giving the wavelength, call letters, frequency, town and country.

Affiliated DX Clubs

We are hereby placing a standing invitation to reliable DX Clubs to become affiliated with the DX Corner, as associate members acting as advisers on short-wave activities, in promoting short-wave popularity and reception efficiency. A list of associate organizations follows: International DX'ers Alliance, President, Charles A. Morrison; Newark News Radio Club, Irving R. Potts, President; A. W. Oppel, Executive Secretary; Society of Wireless Pioneers, M. Mickelson, Vice-President; U. S. Radio DX Club, Geo. E. Deering, Jr., President; the Radio Club Venezolano of Caracas, Venezuela, President, Alberto Lopez. Any DX fan wishing to join any one of these clubs or associations may write for information to the Short-Wave DX Editor, and his letter will be sent to the organization in question. Other clubs who wish to become affiliated should make their application to the Short-Wave DX Editor.

Clubs associated with the DX Corner have the privilege of sending in club notes for publication in RADIO NEWS.

Short Wave Club News

Mr. Mickelson, Vice President of the Short Wave Pioneers, sends in the following Club News: "A good barometer, a thermometer, and a weather-vane should be part of the equipment of every DXer's shack. Members in the 10-year class will be known as 'Junior Pioneers,' and the pre-war gang will be known as 'P Ws.' Henry B. Shields of Failsworth, Lancashire, England, and R. E. James of Braemer, Elmhurst, Nottinghamshire, England, have been appointed joint directors of British affairs, and correspondence relative to England and Europe should be sent to them. The society has been appointed an associate member of the 'World Radio Research League.'" Invitations to become associated with the DX Corner are being sent out to a number of clubs including the "Worldwide Dial Club" of Chicago, and "The Explorers," Springfield, Mass.

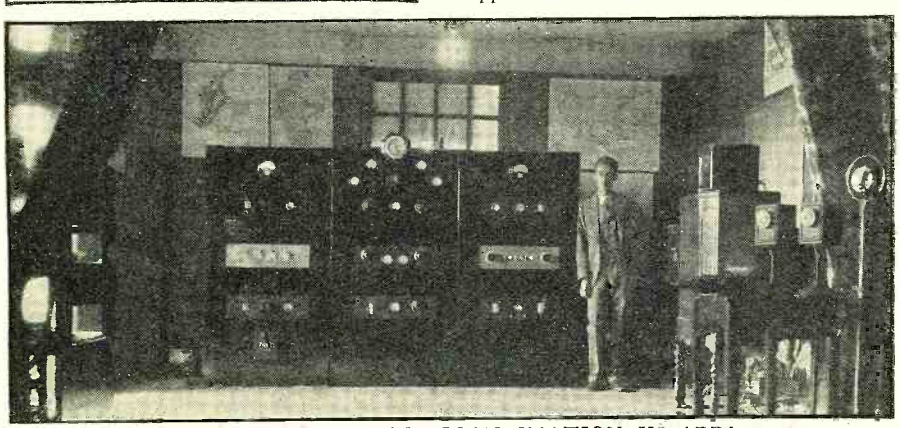
Your DX Logs Welcome

Please keep on sending in information on any stations and Best Bets that you hear during the coming month, getting them in to the short-wave DX Editor, by the 20th of the month. In this way you share your "Best Catches" with other readers and they, in turn share with you, making for improved general knowledge on short-wave reception. Our Editors are doing the same thing, working with you day and night, to bring you the best and most reliable short-wave information. Your logs are welcome and are sincerely invited.

Honors for RADIO NEWS Observers

Although nothing has been said about it in the DX Corner, the Editors decided that they would give a prize for the best report sent in on the recent Stratosphere Flight. The prize has been donated by Mr. Carl A. Johnson, whose father, Mr. A. E. Johnson, resides in Loomis, Nebraska, and who salvaged a small piece of the fabric of the gas bag of the stratosphere balloon "Explorer" when it came down on the next farm.

In the opinion of the judges, this prize was won by F. L. Stitzinger, of Forest Park, Erie, Pa., and is being sent to him as a memento of the occasion, along with a letter of presentation. The judges picked ten other Observers for honorable mention for their fine reports: Donald W. Shields, Roseville, Ohio; J. H. Lindblom, Lansing, Iowa; G. R. Bigbee, Ft. Benning, Georgia; S. J. Emerson, Cleveland, Ohio; Dr. G. W.



PAGING SOUTH AMERICAN STATION HJ4ABB!

The transmitter of station HJ4ABB, at Manizales, with its operator, Albert Hoyn

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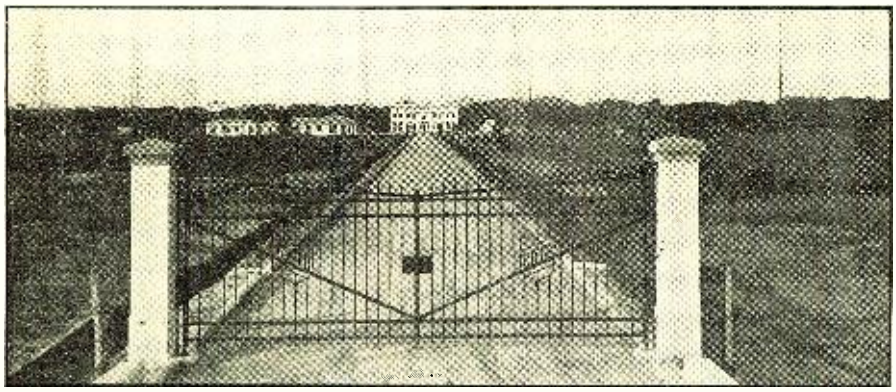


VIEW OF THE BRAZILIAN "MYSTERY" STATION

Entrance to the station PRF5, located at Marapicu, Rio de Janeiro, for quite some time a mystery station to the world's short-wave listeners. Thick jungle was cleared to build the station.

Twomey, Ft. Snelling, Minn.; J. E. Brooks, Montgomery, Ala.; A. E. Emerson, Cleveland, Ohio; C. H. Long, Winston, Missouri; Max Horlick, Youngstown, Ohio, and Charles Nick, Philadelphia, Pa.

All in all, there were over forty contacts from RADIO NEWS Listening Posts directly from the stratosphere balloon. Twenty states are represented by observers sending in reception reports, as follows: Alabama, Georgia, Indiana, Iowa, Kansas, Kentucky, Maryland, Massachusetts, Minnesota, Missouri, New Hampshire, New Jersey, New Mexico, New York, Ohio, Oklahoma, Pennsylvania, Texas, Vermont, and Virginia. Reports were also received from Canada and Mexico. Congratulations to you Short-Wave Observers who were lucky enough to pick up such low-power transmissions at such distances.

Listening Post Observers and Other Fans, Please Note!

We are starting, below, what we believe to be an improved method for listing this month's partial information regarding short-wave stations, heard and reported by our World-Wide Listening Posts. Each item in the listing is credited with the Observer's surname. This will allow our readers to note who obtained the information given. If any of our readers can supply actual Time Schedules, actual Wavelengths, correct Frequencies, or any other Important Information regarding these items, the DX Corner Editor and its readers will be glad to get the information. There are some hard stations to pull in in these listings, but we urge our Listening Posts and other readers to try their skill in logging the stations and getting correct information about them. When you are satisfied that you have this information correct, send it in to the editor; or if you have received a "veri" from any of the hard-to-get stations, send them in or send in a copy of the "veri" so that the whole short-wave fraternity may benefit. The list follows:

12RO has been reported as heard on 9780 kc., 30.67 meters; on 49.2 meters, 6097 kc.; and on 37.4 meters, 8020 kc. Credit to (Armstrong, Emerson, Saldana, Smith, Huff, Peck, Sweisk, and Robinson)

IRS, Rome, Italy, reported on 8050 kc., 5-7 p.m. E.S.T. (Stevens). IRS was reported also on about 37 meters at 6:10 p.m. E.S.T. (Oker)

HI1A, frequency reported changed from 6275 to 6188 kc., 48.4 meters, 12-2 p.m., 8-10 p.m., local time (which is 20 minutes ahead of E.S.T.). They announce "La Voz de Yaque." (Woods)

COH, Havana, Cuba, reported variously as on 9428 kc., 31.8 meters, (Knobel); 9450 kc., 5-6 p.m., 8-9 p.m., E.S.T., also 9430 kc. (Peterson, Schumacher, Hall, Saldana, and Prokosch)

YVQ reported on about 13400 kc., or 13500 kc., 22.48 meters.

DJQ reported heard on 19.63 meters with same program as DJD.

A station, talking Dutch on about 6100 kc., early mornings (Noff). (The Westchester Listening Post reports this is YDA operating on about the same wavelength as old PK1WK up till about 10 a.m., E.S.T.) (Also reported by C. A. Morrison)

T1EP, 22.5 meters, also 22.35 meters, also 13420 kc., giving wavelength for new tests. (Bills). Also reported heard on about this wavelength 12 noon to 3 p.m., E.S.T. (Covington)

HJB reported as a station in Bogota, Colombia.

HC1FG, reported as verified as the call used by Carlos Cordovez when talking to amateurs 20-40 meters. PRADO is the call he uses on his broadcasting station.

YV5RMO, reported as changed in wavelength to 5850 kc., 51.28 meters instead of his old wave. (Emerson)

ORK reported on 29.04 meters up to 4:17 p.m., E.S.T. (Bills)

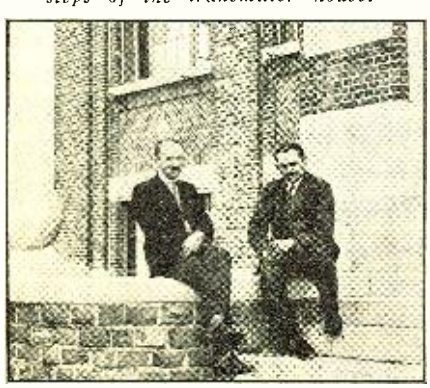
A station with the call PCM was heard on 18530 kc., at 3 p.m., E.S.T. (Schumacher)

HI4D, "La Voz de Quisqueia," Santo Domingo, D.R., reported heard on 6482 kc., 46.25 meters. This stations call has also been reported as HI4B (Hall, Armstrong, Malast)

(*Continued on page* 496)

ENGINEERS IN CHARGE, ORK

Photograph received by L. P. O. Baadsgaard, of Alberta, Canada, in response to a report he sent in on ORK's reception. Photo shows the two engineers-in-charge sitting on the steps of the transmitter house.



S.W. PIONEERS
Official RADIO NEWS Listening Post Observers

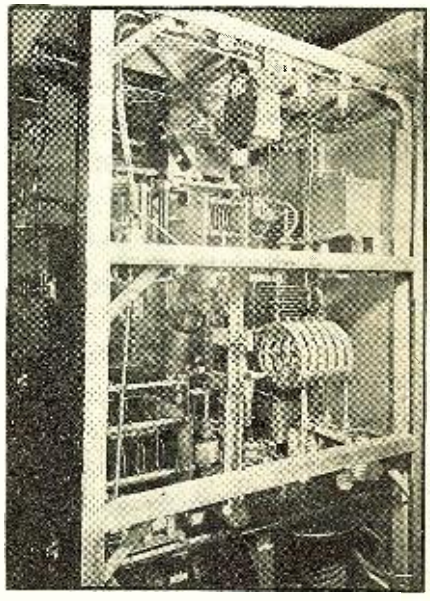
LISTED below by countries are the Official RADIO NEWS Short-Wave Listening Post Observers who are serving conscientiously in logging stations for the DX Corner:

Argentina, J. F. Edbrooke.
Australia, C. N. R. Richardson, C. Arthur Matthews, A. H. Garth, A. E. Faull.
Bermuda, Thursten Clarke.
Brazil, W. W. Enete, Louis Rogers Gray.
British Guiana, E. S. Christiani, Jr.
British West Indies, E. G. Derrick, N. Hood-Daniel, Edela Rosa.
Canada, J. F. Atkinson, Jack Bews, Robert Edkins, W. H. Fraser, Charles E. Roy, A. G. Taggert, Douglas Wood, A. B. Baadsgaard.
Canal Zone, Bertram Baker.
Canary Island, Manuel Davin.
Central America, R. Wilder Tatum.
Chile, Jorge Izquierdo.
China, Baron P. D. N. von Hoyningen-Huene.
Colombia, J. D. Lowe.
Cuba, Frank H. Kydd, Dr. Evelio Villar.
Denmark, Hans W. Priwin.
Dutch East Indies, A. den Breems.
Dutch West Indies, R. J. Van Ommeren.
England, Alan Barber, Donald Burns, Leslie H. Colburn, C. L. Davies, Frederick W. Gunn, R. S. Houghton, W. P. Kempster, R. Lawton, John J. Maling, Norman Nattall, L. H. Plunkett-Checkemian, Harold J. Self, N. C. Smith and John Parkinson, R. Stevens, L. C. Styles, C. L. Wright.
France, J. C. Meillon, Jr.
Germany, Herbert Lennartz.
Hawaii, O. F. Sternemann.
India, D. R. D. Wadio.
Italy, Dr. Guglielmo Tixy.
Japan, Masall Satow.
Malta, Edgar J. Vassallo.
Mexico, Felipe L. Saldana.
New Zealand, Dr. G. Campbell Macdiarmid, Kenneth H. Moffatt.
Norway, Per Torp.
Philippine Islands, Victorino Leonen.
Portugal, Jose Fernandes Patrae, Jr.
Scotland, Duncan T. Donaldson.
South Africa, Mike Kruger, C. McCormick.
Spain, Jose Ma. Maranges.
Switzerland, Dr. Max Hausdorff, Ed. J. de Lopez.
Venezuela, Francisco Fossa Anderson.

Applications for Official Observers in the remaining countries should be sent in immediately to the DX Corner.

THE "WORKS" AT GSA

This is a side view of an intermediate amplifier stage used in the Daventry transmitters of the Empire Broadcasting Station.



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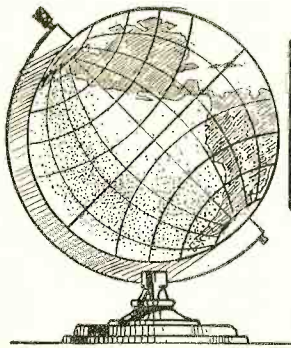
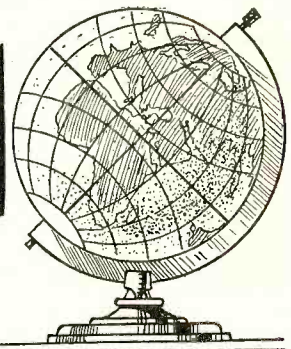


WORLD SHORT WAVE TIME-TABLE



The schedule of short-wave broadcasting stations listed below includes only those that are received best in RADIO NEWS LISTENING POSTS. This new schedule is from 8 G. M. T. right around the clock. Both wavelength and frequency are noted for each station. Station locations are found on page 496.

International Short-Wave "Best Bets"

Wavelengths in Meters	*Call Letters*	*Frequency in k.c.*
08 G. M. T. 3 A. M. E. S. T.		
19.7	DJB	15200
25.5	GSD	11750
27.9+ Irregular	JVM	10740
28.1 +Irregular	JVN	10660
30.4 Irregular	JYS	9840
31.3 Except Sun. Irregular	VK3LR	9580
31.4+	DJN	9540
31.4+ Sun.	LKJ1	9540
31.5	GSB	9510
38.0+ Irregular	JYR	7880
44.5+	JVT	6750
48.9+	ZTJ	6122
49.3+ Mon., Fri.	CQN	6073
49.3+	OER2	6072
49.4+Tues.	VQ7LO	6060
49.9+	FIQA	6000
70.2	RW15	4273
09 G. M. T. 4 A. M. E. S. T.		
19.7	DJB	15200
25.5	GSD	11750
27.9+ Irregular	JVM	10740
28.1	CEC	10670
28.1 Irregular	JVN	10660
30.4+ Irregular	JYS	9840
31.2 Sun.	VK2ME	9590
31.3 Except Sun. Irregular	VK3LR	9580
31.3+ Sun.	DJA	9560
31.4+	DJN	9540
31.4+ Sun.	LKJ1	9540
31.5	GSB	9510
38.0+ Irregular	JYR	7880
44.5+	JVT	6750
48.9+	ZTJ	6122
49.0+	VDA	6120
49.3+ Mon., Fri.	CQN	6073
49.3+ Irregular	OER2	6072
49.9+ Ex. Tu., Th., Sat.	RW59	6000
70.2	RW15	4273
10 G. M. T. 5 A. M. E. S. T.		
19.7	DJB	15200
19.8+ Except Sun.	HVJ	15123
25.5	GSD	11750
27.9+ Irregular	JVM	10740
28.1	CEC	10670
28.1 Irregular	JVN	10660
30.4+ Irregular	JYS	9840
31.2+ Sun.	VK2ME	9590
31.3 Except Sun.	VK3LR	9580
31.3+ Sun.	DJA	9560
31.4+	DJN	9540
31.4+	LKJ1	9540
31.5	GSB	9510
31.5 Wed., Sat.	VK3ME	9510
38.0+ Irregular	JYR	7880
44.5+	JVT	6750
48.9+ Except Sun.	ZTJ	6122
49.0+	YDA	6120
49.3+ Irregular	OER2	6072
49.4+ Mon., Wed., Fri.	VQ7LO	6060
49.8+ Mon., Wed., Thur.	ZHI	6012
50.2 Sun.	HVJ	5969
52.9+	XQAJ	5660
70.2	RW15	4273
11 G. M. T. 6 A. M. E. S. T.		
14.2+	LSN	21020
16.8+ Irregular	W3XAL	17780
19.7	DJB	15200
19.8	GSF	15140
25.2+	GSE	11860
27.9+ Irregular	JVM	10740
28.1+ Irregular	JVN	10660
30.4+ Irregular	JYS	9840
31.2+ Sun.	VK2ME	9590
31.3 Except Sun.	VK3LR	9580
31.3+	W1XAZ	9570
31.3+ Irregular	VUB	9565
31.4+	DJN	9540
31.4+ Irregular	LKJ1	9540
31.5 Wed., Sat.	VK3ME	9510
38.0+ Irregular	JYR	7880
44.5+	JVT	6750
48.9+ Tu., Fri., Sun.	ZGE	6130
48.9+ Except Sun.	ZTJ	6122
49.0+	YDA	6120
49.3+ Irregular	OER2	6072
49.4+ Mon., Wed., Fri.	VQ7LO	6060
49.4+	W8XAL	6060
49.8+ Mon., Wed., Thu.	ZHI	6012
50.1 Ex. Sun.	TGX	6984
52.9+	XQAJ	5560
70.2	RW15	4273
12 G. M. T. 7 A. M. E. S. T.		
13.9+	W8XK	21540
14.2+	LSN	21020
16.8+ Irregular	W3XAL	17780
16.8 Ex. Tues., Wed.	PHI summer only	17775
16.8+	DJE	17760
19.6+	FYA	15243
19.6+ Ex. Tu., Wed. Ir.	PCJ	15220
19.7 Irregular	W8XK	15210
19.7	DJB	15200
19.8	GSF	15140
23.3+ Sun.	CNR	12830
24.8+ Sun.	CT1CT	12082
25.2+	GSE	11860
25.5+ Ex. Tu., Wed., Ir.	PHI	11730
26.0	XGR	11530
27.9+ Irregular	JVM	10740
31.2+ Sun.	VK2ME	9590
31.3 Except Sun.	VK3LR	9580
31.3+	W1XAZ	9570
31.3+ Irregular	VUB	9565
31.4+	DJN	9540
31.4+ Irregular	LKJ1	9540
31.5	GSB	9510
31.8	PLV	9415
38.0+ Irregular	JYR	7880
48.9+ Tu., Fri., Sun.	ZGE	6122
49.0+	YDA	6120
49.1+ Thurs., Fri., Sat.	VE9GW	6096
49.3+ Irregular	OER2	6072
49.4+	W8XAL	6060
49.8+ Mon., Wed., Thu.	ZHI	6012
49.9+ Sun.	HIX	6000
50.1 Ex. Sun.	TGX	5984
52.9+	XQAJ	5660
70.2	RW15	4273
13 G. M. T. 8 A. M. E. S. T.		
13.9+	W8XK	21540
14.2+	LSN	21020
16.8+ Irregular	W3XAL	17780
16.8+ Ex. Tues., Wed.	PHI summer only	17775
16.8+	DJE	17760
19.6+	CP7	15300
19.6	FYA	15243
19.6+ Except Tues., Wed.	PCJ	15220
19.7 Irregular	W8XK	15210
19.7	DJB	15200
19.8	GSF	15140
23.3+ Sun.	CNR	12830
24.8+ Sun.	CT1CT	12082
25.5+ Except Tues., Wed.	PHI	11730
26.0	XGR	11530
31.2+ Sun.	VK2ME	9590
31.3+	W1XAZ	9570
31.3+	DJA	9560
31.4+	DJN	9540
31.4+ Irregular	LKJ1	9540
31.5	GSB	9510
31.8	PLV	9415
48.9+ Sun.	ZTJ	6122
49.0+	YDA	6120
49.1+ Thurs., Fri., Sat.	VE9GW	6096
49.3+ Irregular	OER2	6072
49.4+ Thurs.	VQ7LO	6060
49.4+	W8XAL	6060
49.4+ Sun.	OXY summer only	6060
49.8+ Mon., Wed., Thur.	ZHI	6012
52.9+ Irregular	XQAJ	5663
70.2	RW15	4273
14 G. M. T. 9 A. M. E. S. T.		
13.9+	W8XK	21540
14.2+	LSN	21020
16.8+	W3XAL	17780
16.8+ Ex. Tues., Wed.	PHI summer only	17775
19.6+	CP7	15300
19.6+	FYA	15243
19.6+ Except Tues. Wed.	PCJ	15220
19.7 Irregular	W8XK	15210
19.7	DJB	15200
19.9+ Irregular	RKI	15040
24.9+ Sun.	RW59	12000
25.2+	GSE	11860
25.5+ Except Tues., Wed.	PHI	11730
26.0	XGR	11530
31.2+ Sun.	VK2ME	9590
31.3 Except Sun.	VK3LR	9580
31.3+	W1XAZ	9570
31.3+	DJA	9560
31.4+	DJN	9540
31.4+ Irregular	LKJ1	9540
31.5	GSB	9510
31.8 Except Sat., Sun.	PLV	9415
48.9+	ZTJ	6122
49.0+	VDA	6120
49.0+	YV2RC	6112
49.0+	VE9HX	6110
49.0+ Irregular	VUC	6109
49.1+ Thurs., Fri., Sat.	VE9GW	6096
49.3+ Sun. and Irregular	W9XAA	6080
49.3+	OER2	6072
49.4+	W8XAL	6060
49.8+	COC	6010
70.2	RW15	4273
80.0 Sun.	CT1CT	3750
15 G. M. T. 10 A. M. E. S. T.		
13.9+	W8XK	21540
14.2+	LSN	21020
14.2+	IRW	19700
16.8+	W3XAL	17780
16.8+ Ex. Tues., Wed.	PHI summer only	17775
19.6+	W2XE	15270
19.6+	FYA	15243
19.6+ Except Tues., Wed.	PCJ	15220
19.7	W8XK	15210
19.7	DJB	15200
19.8	VE9DN	15130
19.8+ Irregular	HVJ	15123
24.9+ Sun.	RW59	12000
25.2+	GSE	11860
25.5+ Except Tues., Wed.	PHI	11730
30.0+	KAZ	9990

(*Continued on next page*)

THE WORLD SHORT

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WAVE TIME TABLE

30.5+ Irregular	IRM	9820
31.2 Sun.	VK2ME	9590
31.3+	W1XAZ	9570
31.3+	DJA	9560
31.4+	DJN	9540
31.4+ Irregular	LKJ1	9540
31.5	GSB	9510
31.7+	COH	9428
31.8 Irregular	PLV	9410
48.9+	ZTJ	6122
49.0+	YDA	6120
49.0+	YV2RC	6112
49.0+ Except Sat., Sun.	VE9HX	6110
49.0+	VUC	6109
49.1+ Thu., Fri., Sat.	VE9GW	6096
49.3+ Sun and Irregular	W9XAA	6080
49.3+	OER2	6072
49.4+ Sun., Wed.	VQ7LO	6060
49.4+	W8XAL	6060
49.5	GSA	6050
49.8+ Sun.	ZHI	6012
49.8+	COC	6010
49.8+	XEBT	6010
49.9+ Except Sun.	FIQA	6000

16 G. M. T. 11 A. M. E. S. T.

13.9+	W8XK	21540
14.2+	LSN	21020
16.8+	W3XAL	17780
16.8+	DJE	17760
17.3+ Fri., Irregular	W3XL	17300
19.6+	W2XE	15270
19.6+	FYA	15243
19.6+ Ex. Tu., Wed., Ir.	PCJ	15220
19.7	W8XK	15210
19.7	DJB	15200
24.9+ Sun.	RW59	12000
25.2	FYA	11900
25.5+ Ex. Tu., Wed., Ir.	PHI	11730
30.0+	KAZ	9990
31.3+	W1XAZ	9570
31.3+ Mon., Wed., Sat.	VUB	9565
31.3+	DJA	9560
31.4+	DJN	9540
31.4+ Irregular	LKJ1	9540
31.5	GSB	9510
31.7+ Thurs.	COH	9428
46.5+	HJ1ABB	6447
48.4 Tues., Fri.	HI1A	6188
48.7+	YV3RC	6150
48.9+ Except Sun.	ZTJ	6122
49.0+ Sun.	YV2RC	6112
49.0+ Except Sat., Sun.	VE9HX	6110
49.0+	VUC	6109
49.1+ Thu., Fri., Sat.	VE9GW	6096
49.3+ Sun. and Irregular	W9XAA	6080
49.3+	OER2	6072
49.4+ Except Fri.	VQ7LO	6060
49.4+	W8XAL	6060
49.4+ Sun.	OXY winter only	6060
49.5	GSA	6050
49.8+ Sun.	ZHI	6012
49.8+	XEBT	6010
49.9+ Wed., Sat.	FIQA	6000
50.1 Except Sun.	TGX	5984
50.2	HJ2ABC	5973

17 G. M. T. 12 Noon E. S. T.

13.9+	W8XK	21540
14.2+	LSN	21020
16.8+	W3XAL	17780
16.8+	DJE	17760
17.3+ Fri., Irregular	W3XL	17300
19.6+	W2XE	15270
19.6+	FYA	15243
19.7	W8XK	15210
22.3+ Sun.	TIEP	13420
25.2	FYA	11900
25.4	I2RO	11810
25.5	DJD	11760
25.5	GSD	11750
25.6 Irregular	FYA	11720
26.0 Irregular	XAM	11530
30.6+ Irregular	GCW	9790
31.2+	W3XAU	9590
31.3+	W1XAZ	9570
31.3+ Mon., Wed., Sat.	VUB	9565
31.4+ Irregular	LKJ1	9540
31.7+ Thurs.	COH	9428
40.5 Except Sun.	HJ3ABD	7402
45.3+	RV72	6611
46.5+	HJ1ABB	6447
47.5 Sun.	HIZ	6315
48.4 Tues., Fri.	HI1A	6188
48.7+	YV3RC	6150
48.9+	ZTJ	6122
49.0+ Ex. Sat., Sun.	VE9HX	6110
49.0+ Sat.	VUC	6109
49.1+ Thu., Fri., Sat.	VE9GW	6096
49.3+ Sun. and Irregular	W9XAA	6080
49.3+	OER2	6072
49.4+ Except Fri.	VQ7LO	6060
49.4+	W8XAL	6060
49.5	GSA	6050
49.8	DJC	6020
49.8+ Sat., Sun.	ZHI	6012
49.8+	XEBT	6010
50.1 Except Sun.	TGX	5984

18 G. M. T. 1 P. M. E. S. T.

13.9+	W8XK	21540
14.2+	LSN	21020
15.2 Irregular	IRW	19700
16.5+	LSY	18115
16.8+	W3XAL	17780
16.8+	DJE	17760
17.3+ Fri., Irregular	W3XL	17300
19.5	W2XAD	15330
19.6+	W2XE	15270
19.7	W8XK	15210
22.3+ Sun.	TIEP	13420
25.2	FYA	11900
25.4	I2RO	11810
25.5	DJD	11760
25.5	GSD	11750
30.4 Sat.	EAQ	9860
30.6+ Irregular	GCW	9790
31.2+	W3XAU	9590
31.3+	W1XAZ	9570
31.4+ Irregular	LKJ1	9540
31.5	GSB	9510
40.5	HJ3ABD	7402
46.5+	HJ1ABB	6447
47.5 Sun.	HIZ	6315
48.4	HI1A	6188
48.7+	YV3RC	6150
48.9+	ZTJ	6122
49.0+ Except Sat., Sun.	VE9HX	6110
49.1+ Ex. M., T., Wed.	VE9GW	6096
49.3+ Sun. and Irregular	W9XAA	6080
49.3+	OER2	6072
49.3+ Sun.	VE9CS	6070
49.4+ Except Fri.	VQ7LO	6060
49.4+	W8XAL	6060
49.4+	OXY	6060
49.8	DJC	6020
49.8+	XEBT	6010
73.0+ Except Mon.	HCJB	4107
84.6+ Mon., Thu., Sat.	CR7AA	3543

19 G. M. T. 2 P. M. E. S. T.

16.8+	W3XAL	17780
17.3+ Fri., Irregular	W3XL	17300
19.5	W2XAD	15330
19.7	W8XK	15210
22.3+ Sun.	TIEP	13420
22.7	ORP	13200
25.2	FYA	11900
25.3+	W2XE	11830
25.5	DJD	11760
25.5	GSD	11750
25.6	FYA	11720
28.3+ Time at 20 G.M.T.	FYB	10578
29.0+	ZFD	10335
29.0+	ORK	10330
30.4 Sat.	EAQ	9860
30.5+ Irregular	IRM	9820
30.6 Irregular	GCW	9790
30.7+ Irregular	I2RO	9760
31.2+	W3XAU	9590
31.3+	W1XAZ	9570
31.4+ Irregular	LKJ1	9540
31.5	GSB	9510
41.8 Wed., Sat.	CR6AA	7177
42.0 Sun.	HJ4ABB	7138
43.8+ Irregular	HAS	6840
46.5+ Sun., very irreg.	HJ1ABB	6447
47.5 Sun.	HIZ	6315
48.4	HI1A	6188
48.7+	YV3RC	6150
48.9+	ZTJ	6122
49.0+ Sun.	YV2RC	6112
49.0+ Except Sat., Sun.	VE9HX	6110
49.1+ Except M., T., W.	VE9GW	6096
49.3+ Sun. and Irregular	W9XAA	6080
49.3+	OER2	6072
49.3+ Sun.	VE9CS	6070
49.4+ Sat.	VQ7LO	6060
49.4+	W8XAL	6060
49.4+	OXY	6060
49.6+	W1XAL	6040
49.8	DJC	6020
49.8+	XEBT	6010
49.9+	RW59	6000
50.2+	HVJ	5969
73.0+ Except Mon.	HCJB	4107
84.6+ Mon., Thur., Sat.	CR7AA	3543

20 G. M. T. 3 P. M. E. S. T.

16.8+	W3XAL	17780
17.3+ Fri., Irregular	W3XL	17300
19.4 Sun. summer only	PRADO	15440
19.5+	W2XAD	15330
19.7	W8XK	15210
22.7+	ORP	13200
24.9+ Sun	RW59	12000
25.2	FYA	11900
25.3+	W2XE	11830
25.5	DJD	11760
25.5	GSD	11750
25.6	FYA	11720
28.9+	LSX	10350
29.0+	ZFD	10335
29.0+	ORK	10330
30.5+ Irregular	IRM	9820
30.6+ Irregular	GCW	9790
30.7+	I2RO	9760
31.1+ Tues., Fri.	CT1AA	9600
31.2+	W3XAU	9590
31.3+	W1XAZ	9570
31.4+ Irregular	LKJ1	9540
31.5	GSB	9510
37.3 Sun.	CNR	8035
41.8 Wed., Sat.	CR6AA	7177
42.0 Sun.	HJ4ABB	7138
43.8+ Sun.	HAS	6840
46.5+ Sun.	HJ1ABB	6447
48.9+ Except Sun.	ZTJ	6122
49.0+ Sun.	YV2RC	6112
49.0+ Except Sat., Sun.	VE9HX	6110
49.1 Ex. M., W., Sat.	W9XF	6100
49.1+	VE9GW	6096
49.3+ Irregular	W9XAA	6080
49.3+	OER2	6072
49.3+ Sun.	VE9CS	6070
49.4+	W8XAL	6060
49.4+	OXY	6060
49.8	DJC	6020
49.8+	XEBT	6010
49.9+ Irregular	RW59	6000
84.6+ Mon., Thurs., Sat.	CR7AA	3543

21 G. M. T. 4 P. M. E. S. T.

15.9+	PLE	18830
16.8+	W3XAL	17780
17.3+ Fri. Irregular	W3XL	17300
19.4 Sun. summer only	PRADO	15440
19.6 Irregular	CP7	15300
19.7	W8XK	15210
24.8+ Except Sun.	CT1CT	12082
25.2	FYA	11900
25.2	W8XK	11870
25.3+	W2XE	11830
25.5	DJD	11760
25.5	GSD	11750
25.6	FYA	11720
29.0+	ZFD	10335
29.0+	ORK	10330
30.5+ Irregular	IRM	9820
30.6+ Irregular	GCW	9790
30.7+	I2RO	9760
31.1+ Tues., Fri.	CT1AA	9600
31.2+	W3XAU	9590
31.3+	W1XAZ	9570
31.4+ Irregular	LKJ1	9540
31.5	GSB	9510
31.7+ Irregular	COH	9428
31.8+	PLV	9415
37.3+ Sun.	CNR	8035
41.8 Wed., Sat.	CR6AA	7177
42.0 Sun.	HJ4ABB	7138
43.8+ Irregular	HAS	6847
46.5+ Sun.	HJ1ABB	6447
47.5	HIZ	6315
48.4 Sun. Irregular	HI1A	6188
48.8+	W8XK	6140
48.9+ Sat.	ZTJ	6122
49.0+ Sun.	YV2RC	6112
49.0+	VE9HX	6110
49.1+ Mon., Wed., Sat.	W3XAL	6100
49.1 Ex. M., Wed., Sat.	W9XF	6100
49.1+	VE9GW	6096
49.3+ Irregular	W9XAA	6080
49.3+	OER2	6072
49.3+ Sun.	VE9CS	6070
49.4+	W8XAL	6060
49.4+	OXY	6060
49.5	GSA	6050
49.8	DJC	6020
49.8+	COC	6010
49.8+	XEBT	6010
49.9+	HIX	6000
49.9+ Ex.Tues.,Thu.,Sat.	RW59	6000

22 G. M. T. 5 P. M. E. S. T.

15.9+ Irregular	PLE	18830
19.4 Sun. summer only	PRADO	15440
19.6 Irregular	CP7	15300
24.8+ Ex. Sun.	CT1CT	12082
25.2	FYA	11900
25.2	W8XK	11870
25.6	FYA	11720
30.4	EAQ	9860
30.5+ Irregular	IRM	9820
30.7+	I2RO	9760
31.1+ Tues., Fri.	CT1AA	9600
31.2+	W3XAU	9590
31.3	HBL	9580
31.3+	W1XAZ	9570
31.3+	DJA	9560
31.4+	DJN	9540
31.4+ Irregular	W2XAF	9530
31.5	GSB	9510
31.5+	PRF5	9505
31.7+	COH	9428
37.3+ irregular	IRS	8020
38.4+ Sat.	HBP	7790

(*Continued on next page*)

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SHORT-WAVE TIME TABLE

40.5+	HJ3ABD	7402
43.8+ Irregular	HAS	6840
44.6	TIEP	6710
45.0+ Sun.	HC2RL	6668
46.1	HJ5ABD	6504
46.5+ Sun. Irregular	HJ1ABB	6447
46.6+ Fri.	W3XL	6425
47.0+	YV4RC	6375
47.5	HIZ	6315
48.7+ Irregular	YV3RC	6150
48.8+	W8XK	6140
49.0	W2XE	6120
49.0	YDA	6120
49.0+	YV2RC	6112
49.0+ Sat.	VE9HX	6110
49.1+ Mon., Wed., Sat.	W3XAL	6100
49.1+ Ex.Mon.,Wed.,Sat.	W9XF	6100
49.1+	VE9GW	6096
49.3+ Irregular	CP5	6080
49.3+ Sun. and Irregular	W9XAA	6080
49.3+	OER2	6072
49.3+ Sun.	VE9CS	6070
49.4+	W8XAL	6060
49.4+	OXY	6060
49.5	GSA	6050
49.8	DJC	6020
49.8+	COC	6010
49.8+	XEBT	6010
49.9+	HIX	6000
49.9+ Irregular	RW59	6000
50.4	HJ2ABA	5880
50.6 Irregular	HJ4ABE	5860
51.2+	YV5RMO	5850

23 G. M. T. 6 P. M. E. S. T.

15.9+ Ex. Sat., Sun.	PLE	18830
19.4 Sun. summer only	PRADO	15440
25.2	W8XK	11870
25.6	FYA	11720
25.6	CJRX	11720
30.4	EAQ	9860
30.5+ Irregular	IRM	9820
30.7+ Irregular	I2RO	9760
31.2+	W3XAU	9590
31.3	GSC	9585
31.3	HBL	9580
31.3+	W1XAZ	9570
31.3+	DJA	9560
31.4+	DJN	9540
31.4+	W2XAF	9530
31.5+	PRF5	9505
31.7+ Irregular	COH	9428
37.3+ Irregular	IRS	8020
38.4+ Sat.	HBP	7790
42.0 Ex. Sat., Sun.	HJ4ABB	7138
40.5+	EA8AB	7403
40.5+	HJ3ABD	7402
44.6	TIEP	6710
45.0+ Sun.	HC2RL	6668
46.1	HJ5ABD	6504
46.5+	HJ1ABB	6447
46.6+ Fri.	W3XL	6425
47.0+	YV4RC	6375
48.4 Sun., Irregular	HI1A	6188
48.7+	CJRO	6150
48.7+	YV3RC	6150
48.8+	W8XK	6140
49.0	W2XE	6120
49.0	YDA	6120
49.0+	YV2RC	6112
49.0+	VE9HX	6110
49.1+ Mon., Wed., Sat.	W3XAL	6100
49.1+ Ex.Mon.,Wed.,Sat.	W9XF	6100
49.1+	VE9GW	6096
49.2+ Mon., Wed., Fri.	I2RO	6085
49.3+ Irregular	CP5	6080
49.3+ Sun. and Irregular	W9XAA	6080
49.3+ Irregular	OER2	6072
49.3+	VE9CS	6070
49.4+	W8XAL	6060
49.4+	OXY	6060
49.5	GSA	6050
49.6+	HJ1ABG	6042
49.8	DJC	6020
49.8+ Irregular	COC	6010
49.8+	XEBT	6010
50.1 Except Sun.	TGX	5984
50.6 Tues., Thurs., Sat.	HJ4ABE	5860
51.2+	YV5RMO	5850
51.4+	HJ2ABC	5824
69.4 Irregular	G6RX	4320

00 G. M. T. 7 P. M. E. S. T.

15.9+ Except Sat., Sun.	PLE	18830
25.2	W8XK	11870
25.6	FYA	11720
25.6	CJRX	11720
28.9+	LSX	10350
30.4 Tu., Thu., Sat., Sun.	EAQ	9860
30.5+ Irregular	IRM	9820
31.2+	W3XAU	9590
31.3	GSC	9580
31.3	HBL	9580
31.3+	W1XAZ	9570
31.3+	DJA	9560
31.4+	DJN	9540
31.4+	W2XAF	9530
31.5+ Irregular	PRF5	9505
32.8+	CP6	9120
38.4+ Sat., Irregular	HBP	7790
40.5	HJ3ABD	7400
42.0 Tues., Fri.	HJ4ABB	7138
44.0+	VNLF	6800
44.6+	TIEP	6710
45.0+ Sun.	HC2RL	6668
46.1	HJ5ABD	6504
46.5+	HJ1ABB	6447
46.6+ Fri.	W3XL	6425
47.0+	YV4RC	6375
47.8	HJ3ABF	6275
48.7+	CJRO	6150
48.7+	YV3RC	6150
48.8+	W8XK	6140
48.9+	ZGE	6130
49.0	W2XE	6120
49.0+	YV2RC	6112
49.0+	VE9HX	6110
49.1+ Mon., Wed., Sat.	W3XAL	6100
49.1+	VE9GW	6096
49.2+ Mon., Wed., Fri.	I2RO	6085
49.3+	CP5	6080
49.3+ Sun. and Irregular	W9XAA	6080
49.3+	VE9CS	6070
49.4+	W3XAU	6060
49.5	GSA	6050
49.6+	HI1ABG	6042
49.6+ Sun., Tu., Thu.	W1XAL	6040
49.8	DJC	6020
49.8+ Sun. Irregular	COC	6010
49.8+	XEBT	6010
49.9+ Irregular	HIX	6000
50.1 Except Sun.	TGX	5984
50.4 Irregular	HJ2ABA	5880
50.6 Except Wed., Sun.	HJ4ABE	5860
51.2+	YV5RMO	5850
51.4+	HJ2ABC	5824
69.4 Irregular	G6RX	4320

01 G. M. T. 8 P. M. E. S. T.

15.9 Except Sat., Sun.	PLE	18830
25.2	W8XK	11860
25.6	FYA	11720
25.6	CJRX	11720
28.9	LSX	10350
31.2+	W3XAU	9590
31.3+	W1XAZ	9570
31.3+	DJA	9560
31.4+	DJN	9540
31.4+	W2XAF	9530
37.5	HC2JSB	8000
40.5+	HJ3ABD	7402
42.0 Tues., Fri.	HJ4ABB	7138
44.6	TIEP	6710
46.1	HJ5ABD	6504
46.5+	HJ1ABB	6447
46.6+ Fri.	W3XL	6425
47.0+	YV4RC	6375
47.8	HJ3ABF	6275
48.4	HI1A	6188
48.7+	CJRO	6150
48.7+	YV3RC	6150
48.8+	W8XK	6140
48.8+	W2XE	6120
49.0	YDA	6120
49.0+	YV2RC	6112
49.0+	VE9HX	6110
49.1+ Mon., Wed., Sat.	W3XAL	6100
49.1+ Ex.Mon.,Wed.,Sat.	W9XF	6100
49.1+ Except Sun.	VE9GW	6096
49.3+	CP5	6080
49.3+	W9XAA	6080
49.3+ Sun.	VE9CS	6070
49.6+	HJ1ABG	6042
49.6+ Sun., Tues., Thu.	W1XAL	6040
49.8	DJC	6020
49.8+ Sun. Irregular	COC	6010
49.8+	XEBT	6010
49.9+	HIX	6000
50.1 Except Sun.	TGX	5984
50.4 Irregular	HJ2ABA	5880
50.6 Mon., Wed., Fri.	HJ4ABE	5860
51.2+	YV5RMO	5850
51.4	HJ2ABC	5824
51.9	OAX4B	5820
51.9+	TIX	5795
64.5+ Wed., Sat.	HC2EP	4650
69.4+	G6RX	4320
73.0+ Except Mon.	HCJB	4107

03 G. M. T. 10 P. M. E. S. T.

24.9+ Sun.	RW59	12000
25.6	FYA	11720
25.6	CJRX	11720
28.1	CEC	10670
31.2+	W3XAU	9590
31.3+	W1XAZ	9570
31.3+	DJA	9560
31.4+	DJN	9540
31.4+	W2XAF	9530
38.3+ Irregular	OA4AC	7820
40.5+ Except Sun.	HJ3ABD	7402
42.0	HJ4ABB	7138
44.6+ Testing	TIEP	6710
44.8	YNLF	6692
45.0+ Tues., Fri.	HC2RL	6668
45.3 Thurs.	PRADO	6618
46.5+ Irregular	HJ1ABB	6447
46.6+ Fri.	W3XL	6425
47.0+	YV4RC	6375
47.5 Sat.	HIZ	6315
47.8	HJ3ABF	6275
48.4 Irregular	HI1A	6188
48.7+	CJRO	6150
48.7+	YV3RC	6150
48.8+	W8XK	6140
49.0	YDA	6120
49.0+	YV2RC	6112
49.0+	VE9HX	6110
49.1+ Mon., Wed., Sat.	W3XAL	6100
49.1+ Ex.Mon.,Wed.,Sat.	W9XF	6100
49.1+ Except Sun.	VE9GW	6096
49.3+ Irregular	CP5	6080
49.3+	W9XAA	6080
49.3+ Sun.	VE9CS	6070
49.4+	W8XAL	6060
49.6+	HJ1ABG	6042
49.8	DJC	6020
49.8+ Sun.	ZHI	6012
49.8+	XEBT	6010
49.8+ Irregular	COC	6010
49.9+ Sat.	HIX	6000
50.6 Mon., Wed., Fri.	HJ4ABE	5860
51.2+	YV5RMO	5850
51.9	OAX4B	5820
51.9+ Irregular	TIX	5795
64.5+	HC2EP	4650
69.4+ Irregular	G6RX	4320
73.0+ Except Mon.	HCJB	4107

04 G. M. T. 11 P. M. E. S. T.

24.9+ Irregular	RW59	12000
25.2 Sun.	W8XK	11870
25.6	FYA	11720
25.6	CJRX	11720
31.3+	W1XAZ	9570
44.6 Testing	TIEP(TI2EP)	6710
45.0 Fri.	TGW	6180
45.0+ Tues.	HC2RL	6668
45.3 Thurs.	PRADO	6618
47.5	HIZ	6315
48.4 Irregular	HI1A	6188
48.7+	CJRO	6150
48.8+	W8XK	6140
48.9+ Except Sun.	ZTJ	6122
49.0	YDA	6120
49.0+	VE9HX	6110
49.1+ Mon., Wed., Sat.	W3XAL	6100
49.1+ Ex.Mon.,Wed.,Sat.	W9XF	6100

(*Continued on page* 496)

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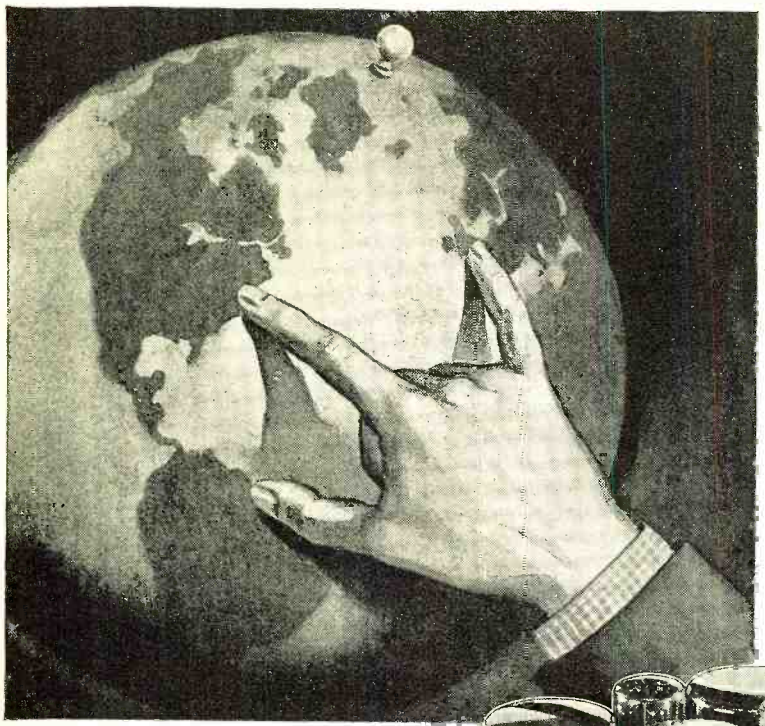
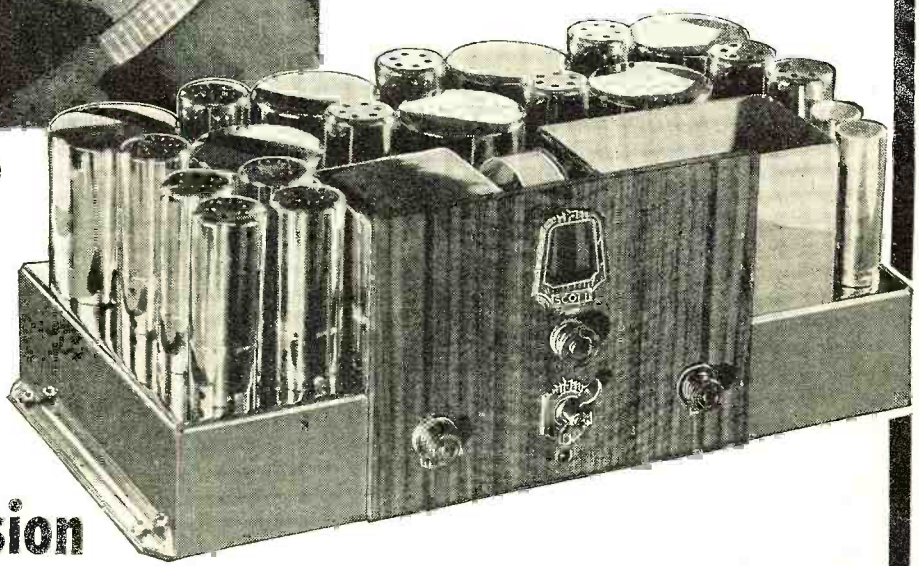
TO SPAN TREMENDOUS MILES



MORE authenticated records for distance reception are held by Scott receivers than by any other radio in the world! What a vitally important ability for the radio buyer—*anywhere* . . . who wants to be *sure* that his receiver will consistently span the tremendous miles to keep him in constant touch with the news, amusements, and music of all the world. The receiver that makes short wave stations in LONDON, PARIS, ROME, BERLIN, SYDNEY . . . as familiar to your ear as domestic broadcast stations.

Custom-built SCOTT ALL-WAVE XV



Giving Better Service *Everywhere*

The performance ability of Scott receivers is being constantly confirmed in world-wide service. In 143 countries overseas—as well as in every state of the U. S. A.—Scott radios are delivering phenomenally fine service. Surmounting climatic and atmospheric difficulties, they bring excellent reception to many localities where all other receivers have failed.

Laboratory Precision Gives it Superiority that Makes it "The World's Finest Receiver"

To deserve this title, the Scott All-Wave XV must be designed and built with notable differences from the practice of other manufacturers. The finer sensitivity, selectivity, volume and realistic tone delivered by this receiver on all wave lengths between 13 and 550 meters comes from true custom-building. Every operation in the construction of a Scott All-Wave XV is done with greater care, is held to more exact limitations, and is checked more carefully on finer scientific equipment than is true of any other all-wave receiver. The result of this higher type of construction is that the Scott All-Wave XV is the only receiver given a 5-year warranty by a responsible manufacturer.

Amazing 30-Day Trial Offer — Send Coupon Now for Details

You be the final judge of the merit of the Scott All-Wave XV. Get one from the Laboratory where it is custom-built—install it in your home—give it 30 days of competitive test against any other all-wave receiver made. If the Scott All-Wave XV does not bring in more stations, from greater distances, with more volume and better tone, on both the short waves and the broadcast band, than any other receiver in the world, you can return it without question. (This trial privilege given only in the U. S. A.)

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4440 Ravenswood Avenue, Dept. 5B5
CHICAGO, ILLINOIS

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4440 Ravenswood Ave., Dept. 5B5, Chicago, Ill.

Send me complete information about the Scott All-Wave XV, including technical data and particulars of your 30-day Trial Offer.

Name_____

Address_____

City_____ State_____

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(*Continued from page* 494)

49.1+ Except Sun.	VE9GW	6096
49.3+ Tues., Sun.	VE9CS	6070
49.4+	W8XAL	6060
49.8+ Sun.	ZHI	6012
49.8+ Sat.	COC	6010
49.8+	XEBT	6010
49.9+ Sat.	VE9DN	6005
49.9+ Sat.	HIX	6000
51.9	OAX4B	5820
51.9+ Irregular	TIX	5795
73.0+ Except Mon.	HCJB	4107

05 G. M. T. 12 Midnight E. S. T.

25.2 Sun.	W8XK	11870
27.9+ Irregular	JVM	10740
28.1+ Irregular	JVN	10660
31.3 Except Sun., Irregular	VK3LR	9580
31.3+	W1XAZ	9570
44.5+ Irregular	JVT	6750
45.0+ Tues.	HC2RL	6668
48.4 Irregular	HI1A	6188
48.8+	W8XK	6140
48.9+ Except Sun.	ZTJ	6122
49.0	YDA	6120
49.0+	VE9HX	6110
49.1+ Exc.Mon.,Wed.,Sat.	W9XF	6100
49.1+ Mon., Wed., Sat.	W3XAL	6100
49.3 Tues., Sun.	VE9CS	6070
49.4+	W8XAL	6060
49.8+ Sat., Sun.	ZHI	6012
49.8+ Sat.	COC	6010
49.8+	XEBT	6010

06 G. M. T. 1 A. M. E. S. T.

27.9+ Irregular	JVM	10740
28.1+ Irregular	JVIV	10660
31.2+ Sun.	VK2ME	9590
31.3 Except Sun. Irregular	VK3LR	9580
38.0+ Irregular	JYR	7880
44.5+	JVT	6750
48.4 Irregular	HI1A	6188
49.0	YDA	6120
49.1+Ex.Mon.,Wed.,Sat.	W9XF	6100
49.3 Tues.	VE9CS	6070
49.4+	W8XAL	6060
49.8+ Sat., Sun.	ZHI	6012
70.2 Irregular	RW15	4273

07 G. M. T. 2 A. M. E. S. T.

27.9+ Irregular	JVM	10740
28.1+ Irregular	JVN	10660
28.3Time at 7:30 G.M.T.	FYB	10578
30.4+ Irregular	JYS	9840
31.2+ Irregular	XETE	9600
31.2+ Sun.	VK2ME	9590
31.3 Ex. Sun. Irregular	VK3LR	9580
44.5+	JVT	6750
49.9+ Sun.	FIQA	6000
70.2	RW15	4273

Station Locations

Wavelength Meters	*Call Letters*	*Frequency Kc.*	*City Country*
13.9+	W8XK	21540	Pittsburgh, Pa.
13.9+	GSH	21470	Daventry, England
14.2+	LSN	21020	Buenos Aires, Argen.
15.2+	IRW	19700	Rome. Italy
15.9+	PLE	18830	Bandoeng, Java
16.5	LSV	18115	Buenos Aires, Argen.
16.8+	GSG	17790	Daventry, England
16.8+	W3XAL	17780	Bound Brook, N. J.
16.8+	PHI	17775	Huizen, Holland
16.8+	DJE	17760	Zeesen, Germany
17.2+	J1AA?	17380	Kemikawa-Cho.,Jap.
17.3+	W3XL	17300	Bound Brook, N. J.
19.4	PRADO	15440	Riobamba, Ecuador
19.5	W2XAD	15330	Schenectady. N. Y.
19.6+	CP7	15300	La Paz, Bolivia
19.6+	W2XE	15270	New York, N. Y.
19.6+	FYA	15243	Pontoise, France
19.6+	PCJ	15220	Huizen, Holland
19.7	W8XK	15210	Pittsburgh, Pa.
19.7	DJB	15200	Zeesen, Germany
19.8	GSF	15140	Daventry, England
19.8	HVJ	15123	Vatican City
19.9+	RKI	15040	Moscow, U. S. S. R.
22.0	JYK	13610	Kemikawa-Cho., Jap.
22.3+	TIEP	13420	San Jose, Costa Rica
22.7+	ORP	13200	Ruysselede, Belg.
23.3	CNR	12830	Rabat, Morocco
24.8+	CT1CT	12082	Lisbon, Portugal
24.9+	RW59	12000	Moscow, U. S. S. R.
25.2	FYA	11900	Pontoise, France
25.2	W8XK	11870	Pittsburgh, Pa.
25.2+	GSE	11860	Daventry, England
25.3+	W2XE	11830	New York, N. Y.
25.4	I2RO	11810	Rome, Italy
25.4	W1XAL	11790	Boston, Mass.
25.5	DJD	11760	Zeesen, Germany
25.5	GSD	11750	Daventry, England
25.5+	PHI	11730	Huizen, Holland
25.6	FYA	11720	Pontoise, France
25.6	CJRX	11720	Winnipeg, Canada
26.0	XGR	11530	Shanghai, China
27.9+	JVM	10740	Nazaki, Jap.
28.1	CEC	10670	Santiago, Chile
28.1+	JVN	10660	Nazaki, Japan
28.3+	FYB	10578	Paris, France
28.9+	LSX	10350	Buenos Aires, Argen.
29.0+	ZFD	10335	Hamilton, Bermuda
29.0+	ORK	10330	Ruysselede, Belgium
30.0	KAZ	9990	Manila, P. I.
30.4	EAQ	9860	Madrid, Spain
30.4+	JYS	9840	Kemikawa Cho, Jap.
30.5+	IRM	9820	Rome, Italy
30.6+	GCW	9790	Rugby, England
30.7+	I2RO	9760	Rome, Italy
31.1+	CT1AA	9600	Lisbon, Portugal
31.2+	W3XAU	9590	Philadelphia, Pa.
31.2+	VK2ME	9590	Sydney, Australia
31.3	HBL	9580	Geneva, Switzerland
31.3	VK3LR	9580	Lyndhurst, Victoria, Australia
31.3	GSC	9575	Daventry, England
31.3+	W1XAZ	9570	Springfield, Mass.
31.3+	VUB	9565	Bombay, India
31.3+	DJA	9560	Zeesen, Germany
31.4+	DJN	9540	Zeesen, Germany
31.4+	LKJ1	9540	Jeloy, Norway
31.4+	W2XAF	9530	Schenectady, N. Y.
31.5	VK3ME	9510	Melbourne, Australia
31.5	GSB	9510	Daventry, England
31.5+	PRF5	9505	Rio de Janeiro, Braz.
31.7+	COH	9428	Havana, Cuba
31.8	PLV	9415	Bandoeng, Java
32.8	CP6	9120	La Paz, Bolivia
36.6+	PSK	8185	Rio de Janeiro, Braz.
37.3	CNR	8035	Rabat, Morocco
37.3+	IRS	8020	Rome, Italy
37.5	HC2JSB	8000	Guayaquil, Ecuador
38.0+	JYR	7880	Kemikawa-Cho. Jap.
38.3	OA4AC	7820	Lima, Peru
38.4+	HBP	7790	Geneva, Switzerland
40.5+	HJ3ABD	7402	Bogota, Colombia
40.5+	EA8AB	7403	Teneriffe, C. I.
41.8	CR6AA	7177	Lobito, Angola, Port. West Africa
42.0	HJ4ABB	7138	Manizales, Col.
43.0+	EA4AQ	6976	Madrid, Spain
43.8+	HAS	6840	Budapest, Hungary
44.0+	YNLF	6800	Managua, Nicaragua
44.5+	JVT	6750	Nazaki, Japan
44.6+	TIEP	6710	San Jose, Costa Rica
45.0+	HC2RL	6668	Guayaquil, Ecuador
45.3	PRADO	6616	Riobamba, Ecuador
45.3+	RW72	6611	Moscow, U. S. S. R
46.1	HJ5ABD	6504	Cali, Colombia
46.5+	HJ1ABB	6447	Barranquilla, Col.
46.6	W3XL	6425	Bound Brook. N. J.
47.0+	YV4RC	6375	Caracas, Venez.
47.5	HIZ	6315	San Domingo, D. R.
47.8	HJ3ABF	6275	Bogota, Colombia
48.4	HI1A	6188	Santiago de Los Caballeros, D. R.
48.7+	CJRO	6150	Winnipeg, Manitoba
48.7	YV3RC	6150	Caracas, Venezuela
48.7	VE9CL	6150	Winnipeg, Man.
48.8+	W8XK	6140	Pittsburgh, Pa.
48.9+	ZGE	6130	Kuala Lumpur, F. M. S.
48.9+	ZTJ	6122	Johannesburg, Africa
49.0+	W2XE	6120	New York. N. Y.
49.0+	YDA	6120	Bandoeng, Java
49.0+	PK1WK	6116	Java
49.0+	YV2RC	6112	Caracas, Ven.
49.0+	VE9HX	6110	Halifax, N. S.
49.0+	VUC	6109	Calcutta, India
49.1+	W3XAL	6100	Bound Brook, N. J.
49.1+	W9XF	6100	Chicago, Ill.
49.1+	VE9GW	6096	Bowmanville. Can.
49.2+	I2RO	6085	Rome, Italy
49.3+	CP5	6080	La Paz, Bolivia
49.3+	W9XAA	6080	Chicago, Ill.
49.3+	CQN	6073	Macao, Asia
49.3+	OER2	6072	Vienna, Austria
49.3+	VE9CS	6070	Vancouver, B. C.
49.4+	VQ7LO	6060	Nairobi, Kenya, Afr.
49.4+	W8XAL	6060	Cincinnati, Ohio
49.4+	W3XAU	6060	Philadelphia, Pa.
49.4+	OXY	6060	Skamlebaek, Den.
49.5	GSA	6050	Daventry, England
49.6+	HJ1ABG	6042	Barranquilla, Col.
49.6+	W1XAL	6040	Boston, Mass.
49.8	DJC	6020	Zeesen, Germany
49.8+	ZHI	6012	Singapore, Malaya
49.8+	COC	6010	Havana, Cuba
49.8+	XEBT	6010	Mexico City, Mex.
49.9+	VE9DN	6005	Montreal, Quebec
49.9+	HIX	6000	San Domingo, D. R.
49.9+	RW59	6000	Moscow, U. S. S. R.
49.9+	FIQA	6000	Tananarive, Madag.
50.1	TGX	5984	El Liberal, Guatemala
50.2+	HVJ	5969	Vatican City
50.4	HJ2ABA	5880	Tunja, Colombia
50.6+	HJ4ABE	5860	Medellin. Colombia
51.2+	YV5RMO	5850	Maracaibo, Venez.
51.4+	Hj2ABC	5824	Cucuta, Colombia
51.9	OAX4B	5820	Lima, Peru
51.9+	TIX	5795	San Jose. Costa Rica
52.9+	XQAJ	5660	Shanghai, China
64.5+	HC2EP	4650	Guayaquil, Ecuador
69.4	G6RX	4320	Rugby, England
70.2	RW15	4273	Khabarovsk, Siberia
73.0	HCJB	4107	Quito, Ecuador
80.0	CT1CT	3750	Lisbon, Portugal
84.6+	CR7AA	3543	Lourenzo Marques, Mozambique

The DX Corner (Short Waves)

(*Continued from page* 491)

OAX4C, Lima, Peru, reported on 6230 kc., 48.1 meters, 7-9 p.m. (Saldana)

OAX4B, Lima, Peru, reported on 51.78 meters, 8-9 p.m. Wavelength also given as 51.9 meters (Saldana, Loudon)

HC2EP, reported heard on 4600 kc., Wed., Sat., 10-11 p.m., E.S.T. (Armstrong)

YV4RC reported now transmitting on 6375 kc., 47 meters (Emerson, Saldana, and Armstrong)

A station with the call letters OXL, location believed to be Skamlebaek, Denmark, reported on 52 meters testing. (Deater)

XSC (?) China (?) reported on 42 meters (Deater)

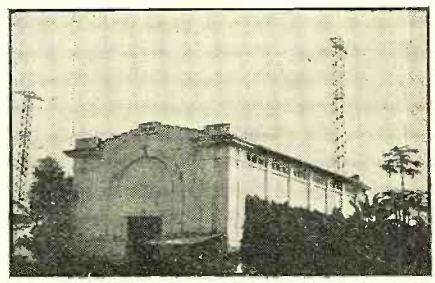
HIH, "La Voz de Higuemo," San Pedro de Macoris, Santo Domingo, D.R., reported heard on 6814 kc., 8-10 p.m. (Emerson, Armstrong)

HJN, Radio Nacional, Bogota, Colombia, reported on 6065 kc., 49.4 meters, 8-9 p.m., E.S.T. (Emerson)

HCK, Quito, Ecuador, 5830 kc., 51.4 meters, changes frequencies up and down, 8-10 p.m., E.S.T. (Emerson)

New Japanese station heard on 25.53 meters at noon C.S.T. Schedule not known. (Mickelson)

YVR, Maracaibo, Venezuela, reported heard on about 33 meters.



OPM-OPL

Here are the transmitter house and the two towers of the Leopoldville, Belgian Kongo, stations

FZT, Madagascar, reported heard on 16 meters at 11 p.m., E.S.T. (Melanson)

FXC, Bearouth, Syria, (?), reported heard on 37.5 meters, 5-6 p.m., E.S.T. (Melanson)

JVF, reported heard on 15620 kc (Bews)

W4XB, Miami, Florida, reported as expecting to be on the air again soon. (Fletcher)

PK1WK, now reported on 8596 meters, 3490 kc.

JIC, 5890 kc., reported heard at 6 a.m., P.S.T. Believed to be Taihoku, Formosa. (Sholin)

PRA8, Radio Club of Pernambuco, reported on the 49 meter band, 4-6 p.m., E.S.T. (Loudon)

Is it old KZRM, Manila, P. I., back on the air on about 48.9 meters from 6-11 a.m., E.S.T.? (Loudon)

HJY, Bogota, Colombia, heard on about 16 meters, 11-12 p.m., E.S.T. (Spearing)

FIQA, Tananarive, Madagascar, reported on 50 meters. (Scala)

VRD, believed to be Suva, Viti Levu, Fiji Islands, 14420 kc., heard on about 6 a.m., E.S.T. (Mickelson)

VK3ZX, Australia, reported on 42.83 meters on Sundays testing and playing records, 12:30-2 p.m., E.S.T. (Mickelson)

JVS, reported heard between 20-00 G.M.T. (Haley)

TSL, Iceland, reported heard on 13970 kc., 6:55-7:10 a.m., E.S.T. (Wood)

YV6RV, reported as Valencia (?) heard on 6030 kc.

EA8AB, Teneriffe, C. I., reported heard on 7211 kc.

JVT, transmitting on 6750 kc., is reported as the best Jap station heard now. (Morrison)

JIC, reported heard occasionally on 5890 kc.

CT1AA, Lisbon, Portugal, wavelength reported changed to 31.17 meters.

CT2AJ, Saint Miguel, Azores, reported heard on 3500 kc. (Kempter)

Have you heard the Indo-American Chain? These are the South American

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and Central American stations reported last month as rebroadcasting each other. They are reported to have joined up into an association under the above name.

VK3LR, Lyndhurst, Australia, may quit transmission on account of the economics of the situation. (Styles)

EA4AQ, Madrid, Spain, reported heard on 6976 kc., 43 meters, on Tuesdays and Saturdays at 10 p.m. (Styles)

DJE, Zeeson, Germany, reported transmitting from 16-19 G.M.T. on 17760 kc.

RMN (?) reported heard on 47.5 meters. (Lawton)

PMY, Bandoeng, Java, reported heard on 58.3 meters, 10:40-14:40 G.M.T. and sometimes as late as 15:40 G.M.T. (Lawton)

New British Empire stations and frequencies reported as follows: GSI, Daventry, England, 19.66 meters; GSJ, Daventry, England, 13.93 meters. (Lawton)

Who has heard Skamlebaek, Denmark, on about 35 meters?

RNE is *not* the proper call for the Soviet broadcasting station at Moscow on 25 meters. The correct call is RW59, the same call used on the 50-meter wavelength. RNE is the call of the 25 meter station when being used for telegraphy.

Note: The Editors will appreciate our readers adding a note to their reception reports telling how they like this new form of reporting hard-to-get stations.

British Empire Transmissions

An official communication from the British Broadcasting Company states that the short-wave stations will be on the air at times shown in the table with the provision that GSB can be substituted for GSC, and GSD can be substituted for GSE and vice versa. Programs are subject to change without notice.

German Short-Wave Transmissions

An official communication from the Reichsrundfunkgesellschaft states that their short-wave stations shall be on the air at the hours shown in this month's schedule. Note that DJN has been added to the stations. DJE is used only for rebroadcasting transmissions to South America. Programs are subject to change without notice.

CQN Transmissions

An official communication from the Postmaster General at Macao (Asia) states that CQN is on the air on Mondays and Fridays from 08.00 till 10.00 G.M.T. The station works on a frequency of 6073 kc. with a power of 0.5 kw.

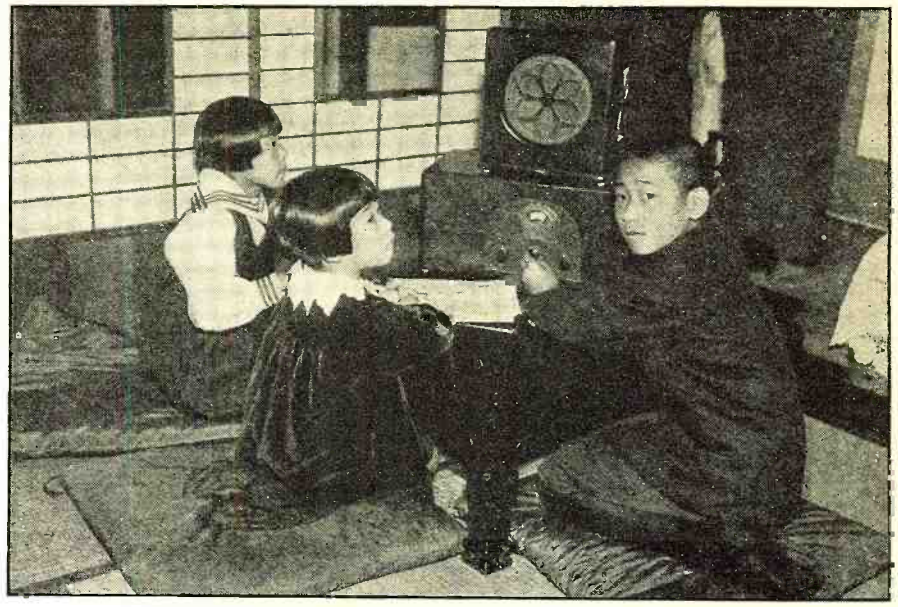
U. S. S. R. Transmissions

An official communication from the Comité de Radiodiffusion et Radiofication at Moscow states that the following short-wave stations transmit programs: RW59, working on 12000 and on 6000 kc. with a power of 20 kw. RW72 works on a frequency of 6610 kc. with a power of 10 kw. RKI, which has a power of 20 kw. transmits on 7500, 7520, 7540, 7545, 15080, 15090 kc. The station RNE is the same as station RW59. The call letters RNE are used for telegraph transmission purposes only, while RW59 is the call when the station is used for broadcasting, both on 50 and 25 meters.

FIQA Transmissions

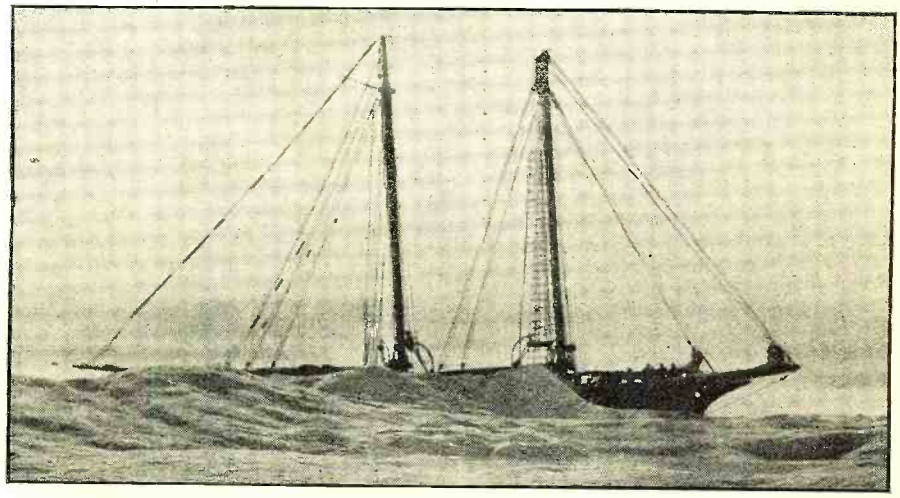
An official communication from the French Administration of Mail Telegraph and Telephones was received by Enrico Scala, Jr., of New York, a RADIO NEWS reader and contributor to the DX Corner. The letter states the FIQA will be on the air daily except Sunday from 08:00 to 08:45 G.M.T. and from 15:00 to 16:00

(*Continued on page* 518)



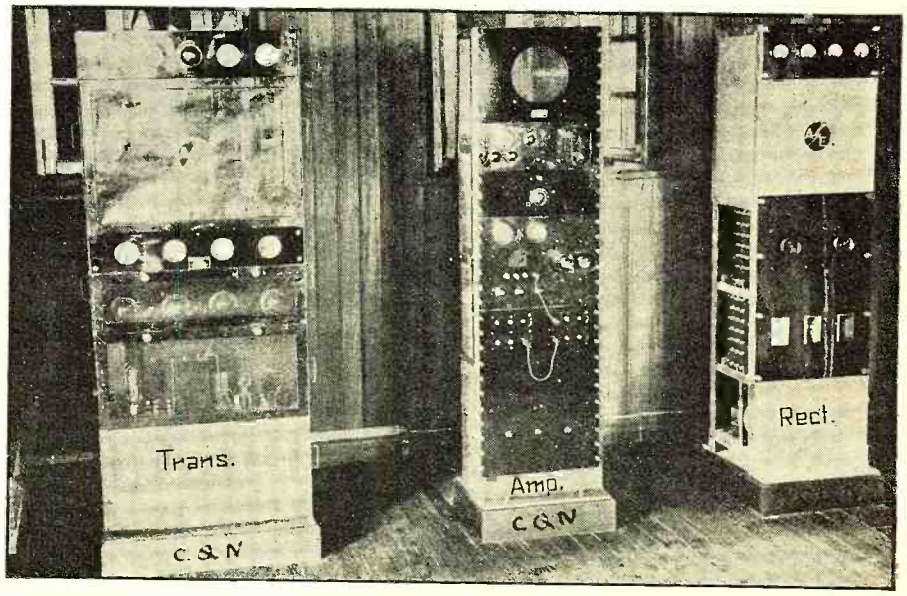
JAPANESE SHORT-WAVE FANS IN TOKIO

Younger members of the family of Rear Admiral Yamamoto, listening to their father's voice broadcast on the short waves, from London.



ONLY THE WATER WAVES WERE FROZEN!

Capt. Bob Bartlett's arctic ship MORRISSEY kept in constant communication with the world through the short waves. No! The cold weather did not affect the radio waves.



THOSE ELUSIVE CHINESE

This is a photograph of the transmitter panels used in station CQN, at Macao, Asia. The markings are self-explanatory.

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SHORT-WAVE PAGE

SHORT-WAVE reception grows in popularity in leaps and bounds. Nearly all receivers on the market today are equipped with a switching arrangement for all-wave reception, thereby increasing, monthly, the army of short-wave listeners many thousand fold. Ninety-nine percent of these newcomers in the field literally "fly" over the dials, covering the 16 to 50-meter bands, thinking that the short-wave-band tuning is the same as on the standard broadcast stations. All DXers will agree that sometimes the foreign signals will be "crying" to be pulled in and these "hasty" tuners pass them by and with a disgruntled expression on their faces, say, "Short waves are the bunk."

WHEN an experienced short-wave fan sits down at a novice's short-wave receiver and literally tours the world with him, the owner often wonders how he did it. Let us look at some of the things the experienced short-wave fans knows that enables him to do it. One must never tune quickly! This is by far the most important point to observe to be successful. Here is a fault that I find many new listeners have. When they try to get some of the elusive stations, especially the low-powered South American and the Asiatics, they turn the volume up to the highest point. So high becomes the noise level that it practically kills the weak signal that is behind. If they had the volume control only one-third up they would not pass over the faint "swish" that denotes a carrier. Once this carrier is heard, a careful tuner can increase the volume and thereby bring in the signal to loudspeaker strength.

If you have not heard all the stations other fans are reporting, do not become discouraged. One day the air is full of short waves and the very next one we would hardly believe we had 20- and 25-kilowatt stations beaming their antennas in our direction. Atmospheric disturbances between here and Europe have much to do with "poor" reception. Short-wave listeners all over the world have to contend with these unseen forces that control reception conditions. To prove the "ups-and downs" in reception we will just look over the results of one month's tuning in of the German station on 25:51 meters. It reads like this. In thirty-one days: DJD was nine days R-9, three days R-8, four days R-6, three days R4; three days R-3, two days R-2, one day R-1, and six days in the course of the month not heard at all. The nine days of R-9 were rainy, and as we have repeatedly said, "Give us a rainy morning and we will log everything on the air." The first time I ever heard a Japanese station was one of those mornings, when the rain had been pouring down all the night. That was back in 1932 when the late J1AA was on 30 meters.

With the new Japanese "J" stations utilizing as high as 20 kilowatts power, one does not have to wait for a rainy day, but can easily log the Asiatic catch with no difficulty at all. JVM, 27.93 meters, was for many a month the best of the "J" stations, but JVT, 44.44 meters, is now heard almost every morning from 4 to 7 a.m., E.S.T. A varied program that is given an American "touch" by the sounding of a gong or the shriek of a siren tells the listener that the program has come to a finish. Easy as it is to log the stations, the next is to wheedle a verification from the stations' directors.

Some fans receive acknowledgments immediately; others wait weary months and never receive a word. Is it luck or does this station answer every 75th letter or maybe after the first 50 veris are sent out, do they discard the rest of the mail into a waiting waste-paper basket?

I understand that Moscow sends out some very fine pictures, magazines, etc., to the fan who happens to send them the 20th, 50th or 100th letter reporting reception on their 25-meter transmissions. I wonder if their promise is anything like the one made by the Santo Dominican station, who repeatedly said over the air, "Anyone reporting these test programs will receive a very fine gift." Did you get it? I didn't. I did receive a veri, but what about the "gift"!

Someone asked me the other day what station, did I think, sent out the most attractive QSL card. The three Australians, in my mind, send out the best verification cards. VK2ME sends us a picture of the hook-a-burra bird; VK3ME, a sketch of a map of Australia with the mileage from the principle cities on it and VK3LR's veri is the neatest card with the crest of the Commonwealth of Australia engraved on it. But the finest veri I ever received was one from the 300-watt station in Japan. JOOK has a gilt-edged card with the call letters in red. Everything is in English on it and its richness of appearance is surprising. A well-known authority told me that JOOK's transmissions were only intended for a radius of 50 miles, therefore, when a report from the States reaches them, they show their deep appreciation by sending the DX'er this fine card.

Another unusual veri that I received was in answer to a report of the *S. S. Rex's* transmissions. The skipper of that vessel sent me a card that had been sent to him from the admiral of the Italian fleet on the maiden voyage of the *Rex*.

The veri received from YVQ, Maracay, Venezuela, was marked both on the envelope and the letter, "Number One."

The few who reported "Radio Budapest" received several highly-colored, picture, post-card views of that beautiful city.

Once a fan sends a report to a station he never knows until the answer comes just what to expect. What would you say if you heard VLK, Australia, contacting London and wrote for a veri and when it comes it reads, "With reference to your letter of Jan. 19th we cannot confirm any matter which takes place on the commercial telephone circuits. You were listening to the VLK transmitter." The English phone circuits located in Rugby will confirm and verify any accurate report sent to them.

How many heard the story told about a certain small-powered station that received a report from a fan who wrote, "Your signals were poor and your modulation terrible." Back came the reply from said station who said, "Sorry; we were not on the air at the time you mentioned." The fan sent them another letter and sent the *same* report only he added, "Your signals were R-9 and your modulation perfect." In the course of time he received a fine veri from the station! Hi! Hi!

Capt. Horace L. Hall

The "Ham" Shack

(*Continued from page* 478)

ployed, are given in Table 1, on page 478.

In the case of the so-called voltage-fed Hertz (although all radiators functioning independently of ground are Hertzian radiators), the determination of the length is quite critical and should be computed as accurately as possible by formula. Even then it may be found that after the antenna has been cut carefully to the correct length, it may not resonate at the computed frequency. The reason for this is that some object is having an effect on the electrical length of the antenna. But in general, if the aerial is strung clear of surrounding objects and the guy wires on the antenna mast are broken up with insulators, there will be no trouble of this kind. The formula for computing the length of the single-wire, voltage-fed antenna is:

$$\text{Length in feet} = \frac{468{,}000}{\text{Frequency in kilocycles}}$$

There is another point to remember in the use of this type antenna. The feeder should be run for at least a quarter wavelength, at right angles to the antenna itself.

The Marconi antenna is finding increasing popularity again. We say "again" because this was the type of antenna used almost exclusively until the amateur started using short waves; that was in 1923. Its reappearance has been due to the increasing activity on the 1750-kilocycle band, where it is practically impossible for most amateurs to erect a half-wave antenna, although quite a few stations are known to

(*Continued on page* 509)

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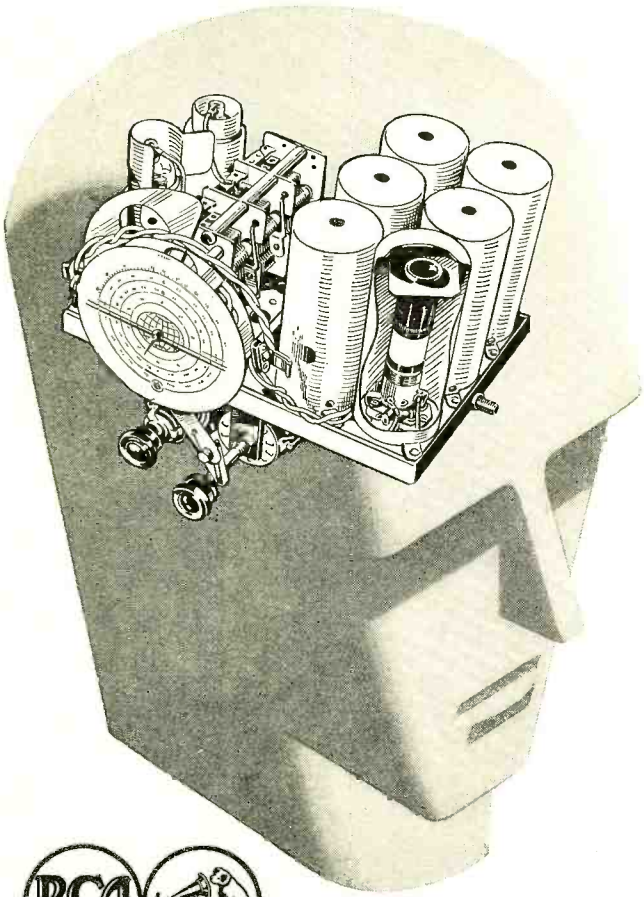
"It's a fact! This RCA Victor 'Magic Brain' is almost human!"



What a thrill to hear...RCA Victor's exclusive development that brings far more stations with greater ease, accuracy. A revelation in all-wave radio plus exclusive RCA Victor "X" band*

DEEP in the center of RCA Victor's newest all-wave radios is placed the "Magic Brain". So human is it, at work, that even hardened radio experts proclaim it "radio's greatest advance in a decade". Each broadcast becomes a miracle of tone perfection—*actual* higher fidelity tone. Each station—your nearby domestic or the most distant foreign—comes in sharp, clear, distinct... rich in tone. And each is easier to tune in. No more wavering. No more buzz. No more rasp or crackle. Instead, bell-like tone . . . and a living reproduction of the broadcast that you'll revel in.

Not only is tone enhanced... but range is increased. Not only domestic and foreign stations, but police, amateur, aviation signals—and that exclusive "X" band* bringing you hourly government weather reports.

Not only all this, but cabinets of surpassing beauty... tastefully designed and patiently built.

For thirty-five years a leader in sound, now RCA Victor proudly gives you the next great forward step—this "Magic Brain".

Already America has thrilled to it! It is a success! So you, too, want one. Go to any RCA Victor dealer, see, hear and *buy* a "Magic Brain" all-wave set! Prices match the times.

A RADIO AND A PRICE FOR EVERYONE!

RCA Victor instruments priced from **$18.75** to $375.00 including Standard Receivers, Auto Radios, Air-Cell Battery Radios and Radio-Phonographs. All RCA Victor instruments equipped with RCA Micro-Sensitive Radio Tubes. All prices F. O. B. Camden, N. J., subject to change without notice. Any short-wave radio performs better with an RCA World-Wide Antenna. *The "X" band is in all sets of 8 tubes or more.

RCA VICTOR COMPANY, INC., ONE UNIT OF RADIO CORPORATION OF AMERICA . . . THE WORLD'S LARGEST RADIO ORGANIZATION. OTHER UNITS: NATIONAL BROADCASTING CO., INC. . . . R. C. A. COMMUNICATIONS, INC. . . . RCA RADIOTRON CO., INC. . . . RADIOMARINE CORP. OF AMERICA

RCA VICTOR

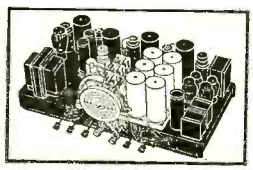
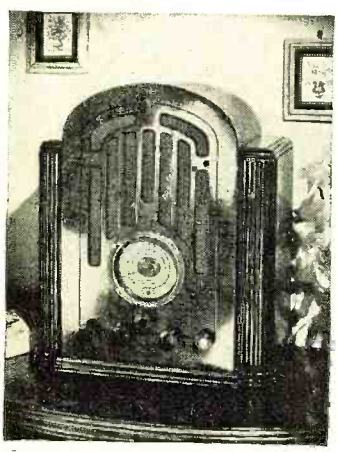


TABLE MODEL 128. "Magic Brain" superheterodyne. Domestic, foreign, police, amateur wave bands. Superb cabinetry. $69.95



What RCA Victor's "Magic Brain" Does

Inside RCA Victor all-wave sets is an uncanny governing unit—shown here as part of the regular circuit and tubes. Human in its thinking, we compare it to the human brain. You choose the broadcast—from no matter where in the whole world. Then, watchman-like, it keeps out undesired radio signals. It concentrates on that one and makes it four times stronger. *Each* tone has higher fidelity... in a quality reception heretofore unequalled.

CONSOLE MODEL 281. "Magic Brain" superheterodyne. 5 bands including exclusive "X". High-low tone control. Superb audio compensation. $225

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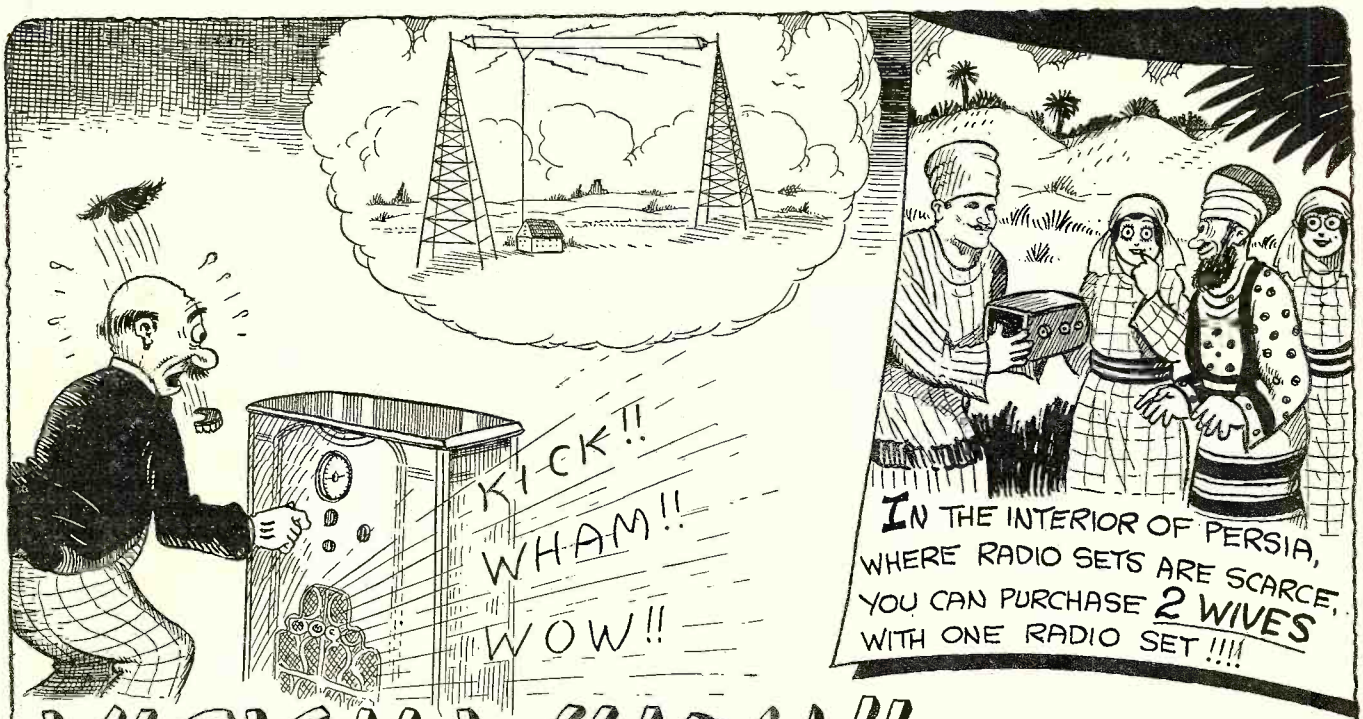
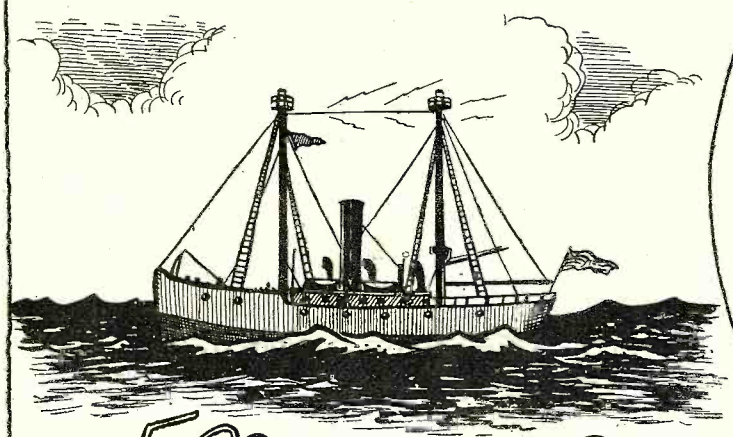
RADIO FACTS and ODDITIES .... By H.T.ELMO

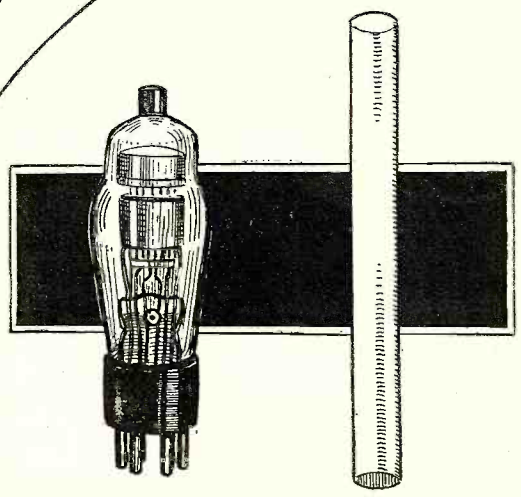


KICK!! WHAM!! WOW!!

IT'S NOT A **FIGHT**, BUT THE ACTUAL CALL LETTERS OF BROADCASTING STATIONS IN THE UNITED STATES !!!



THE FIRST SHIP AIDED BY RADIO WAS THE EAST GOODWIN LIGHTSHIP WHICH WAS SEVERELY DAMAGED BY A HEAVY SEA IN JAN. 1899 .... ASSISTANCE WAS PROMPTLY DESPATCHED IN ANSWER TO THE WIRELESS MESSAGE AND EVERYONE ABOARD WAS SAVED AS A RESULT !!



A RADIO TUBE IS NOT A TUBE !!!

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Informal Tests on

16-TUBE ALL-WAVE "SUPER"

By the Staff

A TECHNICAL description of the 1935 Midwest 16-tube all-wave receiver was published in the November, 1934, issue of RADIO NEWS on page 299. The receiver available for test at that time was a preliminary experimental model. Since then a new receiver—a regular production model—has been sent to our laboratory. This is a report of tests on this production model.

WHEN the receiver is first unpacked, it looks so totally unlike other receivers that some operating hints would not be amiss. There are three "lever" controls and two knobs. The set is turned "on" (not until the speaker plug and all tubes are inserted) by means of the lever on the right. This lever then controls the coupling of one of the i.f. transformers and thereby regulates the selectivity. On the broadcast band (for local reception) this lever can be set at normal which is the vertical position. The two other levers can also be left in a vertical position and so, for those in the family who do not listen to short-waves it becomes a two-control receiver. The knob at the right is the tuning control, the knob at the left is the volume control. The pilot light dims when you are tuned to a station and it goes out altogether when a local station is tuned in correctly. Coming back to the lever at the right, the "micro-tenuator." When the best quality is wanted, this lever can be turned clockwise as far as it will go. The set is then somewhat broad in tuning. This was found to work very well; especially in the daytime when there is little interference. The tone control—lever at your left—is also somewhat unusual. It reduces high notes when turned toward the right, or emphasizes low notes when turned to the left. Furthermore, by turning it completely upside down, these two actions are mixed.

For short-wave reception, we found that we preferred to set the "micro-tenuator" on "broad," the tone control with a bit of the "high" eliminated, volume control all the way up. The middle lever is the wave-band switch.

After a preliminary tryout in the RADIO NEWS laboratory, the set was brought to the Westchester Listening Post. Here an L-type antenna and feeder were used with a total length of approximately 150 feet.

Stations received in this location were: YV4RC, XEBT, COC, DJC, GSA, W3XAU, W8XAL, W9XAA, VE9GW, W9XF, W3XAL, W2XE, W8XK, YV3RC, HJ1ABB, HJ5ABD, XAL (code, calling CQ), TIEP, COH, GSB, W2XAF, DJN, DJA, W1XAZ, GSC, VK3LR, VK2ME, PHI, GSD, DJD, GSE, W8XK, KW59 (25 m.), GSF, DJB, W8XK, PCJ, FYA, W3XAL, GSG.

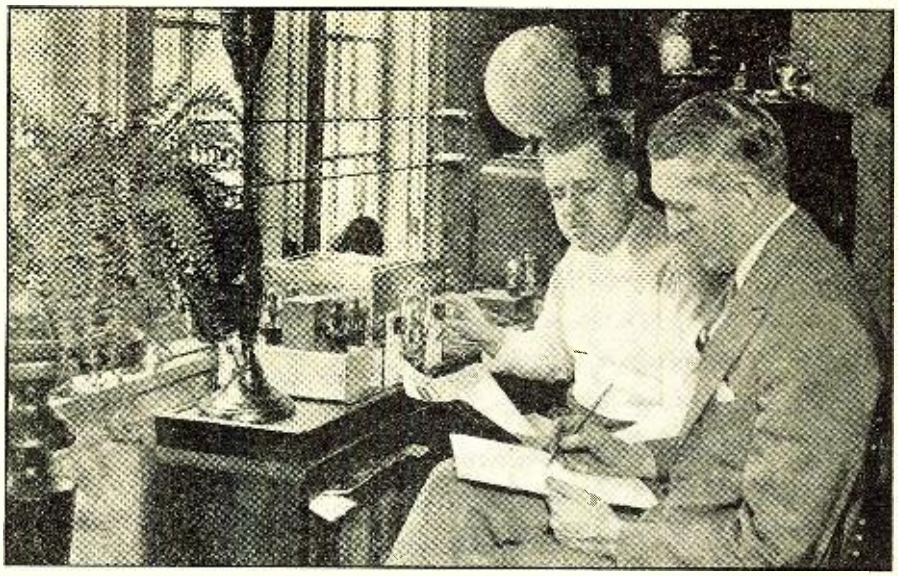
The set was found especially sensitive on the 50-meter band. Here it was sometimes necessary to turn back the "micro-tenuator" to "distance," which makes it sharper so that stations can be better separated. Another outstanding feature of the set is that it seems exceptionally quiet between stations. The special tube, working as automatic tone control proves a welcome improvement over some of the prevalent "squelch" circuits. The calibration on all short-wave bands was very good, the error never being more than half a division.

The receiver was used for a period of a few weeks at another RADIO NEWS Listening Post in the city of New York. The antenna used here was about 80 feet long and of the L-type directed to South America. Short wave reception included among others the following stations: XEBT, COC, DJC, GSA, W8XAL, W9XAA, CP5, VE9GW, W3XAL, W9XF, VE9HX, YV2RC, W2XE, W8XK, YV3RC, CJRO, HJ1ABB, HC2RL (9760 kc.), PRF5, GSB, VK3ME, W2XAF, DJA, W1XAZ, GSC, VK2ME, W3XAU, I2RO (9760 kc.), EAQ, CJRX, FYA, PHI, GSD, DJD, W2XE, W8XK, PCJ, FYA, W2XE, W3XAL.

These stations are listed in the order of frequency. There were more stations received but they could not be identified. Most of these short-wave stations dim the pilot light to some extent. This is a good tuning help for this action is very sharp on the short waves.

Sensitivity on the broadcast band, too, was very good. Such stations as KFI and KOA can be gotten in the early evening. We were not able to get New Orleans on 850 in this location.

The third test was made in a RADIO NEWS Listening Post located in an apartment house, approximately nine miles distant from the heart of New York City. The L type antenna employed was 100 feet in length. This test was conducted over a period of 12 hours and loudspeaker volume was obtained without difficulty from the following short-wave stations: W3XAL, FYA, on 19.6 and 25.2 meters; W8XK, on 19.7 meters and 25.2 meters; PCJ, GSF, W2XE, on 25.3 and 49.0 meters; GSE, GSD, PHI, EAQ, I2RO, VK2ME, DJA, GSC, W2XAF, GSB, CJRO, W9XF, W9XAA, W8XAL, GSA, COC, DJC and HJ2ABC. The reception from PCJ, Huizen, Holland, 19.6 meters, and I2RO, Rome, Italy, on 30.6 meters, was excellent. The English, German and French stations were all good, as was EAQ, Madrid, Spain, on 30.4 meters. The broadcast operating test at this location was handicapped by unusual heavy static. In spite of this, between 9 and 10 P.M. the following stations were received, WCCO, WHAS, KOA, CRCI, WLW, WIP, WICC and KFI.

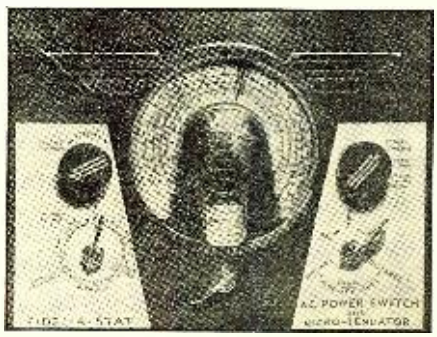


LISTENING TO A PROGRAM FROM HOLLAND

While this picture was being taken at the Westchester Listening Post, during a day's testing on short waves, the programs from station PCJ were being logged

THE TUNING CONTROLS

Here is a view of the panel, the tuning controls, and the novel dial employed. The set is shipped from the factory with two printed cardboard shields over the controls explaining their operation



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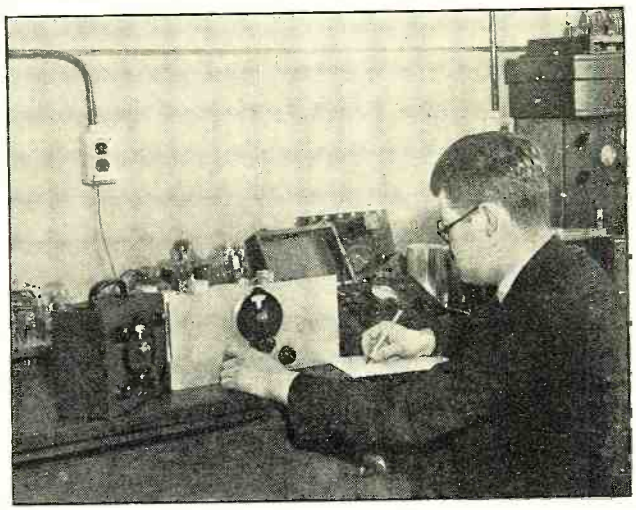
Some Thoughts On

SHORT WAVE CONVERTERS



A well-designed converter will effectively solve the problem of short-wave reception for owners whose broadcast-band receivers are too good to discard as worthless

S. Gordon Taylor

THE modern all-wave receiver is a close approach to the ideal made possible by current technical development, inasmuch as it combines in one instrument the facilities for tuning in stations on both the broadcast band and the short waves. Thus Mr. and Mrs. John Q. Public are provided with the widest variety of radio programs with the minimum operating complications. In spite of the advantages of a good all-wave receiver, however, there is still a place in the radio spectrum for good short-wave converters. This fact is definitely recognized by some of the larger manufacturers who market both all-wave receivers and short wave converters.

There are many homes which boast high quality broadcast-band receivers which are in every way eminently satisfactory to their owners except that they do not provide for short-wave reception. No matter how great the urge of short waves, most owners of such receivers are either unwilling, or unable financially, to scrap them in favor of all-wave receivers. For owners so situated, a good short-wave converter represents the logical answer.

Unfortunately short-wave converters have not built up a particularly enviable reputation, the chief reason being that in too many cases the converter has been designed as a cheap accessory without anything like the careful engineering design that has been put into the short-wave circuits of modern all-wave receivers. Yet people buying these converters have expected as good short-wave results as they would obtain with a good all-wave receiver.

If good short-wave reception is to be obtained from a converter receiver combination it necessarily follows that the converter must meet the same technical requirements and standards as does a good short-wave receiver design. If less real engineering thought is given to the development of the converter, the short-wave results obtained will be correspondingly poor.

Among other things, there has been little inclination to include a stage of tuned r.f. amplification in converters, although such a stage is now included in practically every all-wave receiver. As a result, converters have, for the most part, been noisy in operation and, lacking selectivity, have been unsatisfactory in their ability to suppress repeat points or "images."

Another weakness of many converters has been the lack of adequate shielding. When connected ahead of a superheterodyne broadcast-band receiver, signals at or near the frequency to which the broadcast-band set is tuned have shown a tendency to get through to the receiver, causing birdie whistles.

In addition to these various weaknesses of the more common types of short wave converters, there has been the additional disadvantage that many of them were designed to draw their operating voltages from the broadcast-band receiver. There are a score of obvious objectionable features in this practice.

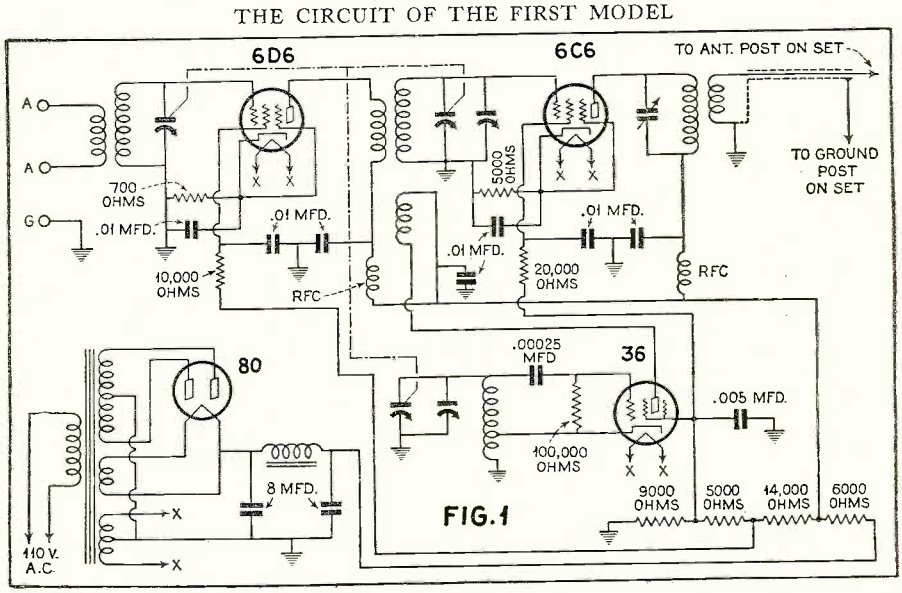
Given a moderately good broadcast-band receiver, excellent short-wave results are obtainable with a *well-designed* converter. Such a converter should meet the following requirements: (1) Thorough shielding, (2) independent power supply, (3) one tuned r.f. stage, (4) tuned-output circuit, and (5) antenna switch by means of which the antenna can be switched from the converter to the broadcast set, or vice versa, without the necessity for disconnecting and reconnecting the antenna whenever a change-over is to be made. In addition to these major requirements, there are certain other desirable refinements, such as single dial control, for instance, which are, of course, an advantage, although not necessarily essential.

For the benefit of those who may possess broadcast-band receivers with which they do not want to part, or which they (*Continued on page* 524)

A NEW S.W. CONVERTER

This first model of the RADIO NEWS *S.W. Converter is now under test. By next month the description of the final model should be ready for publication*

THE CIRCUIT OF THE FIRST MODEL



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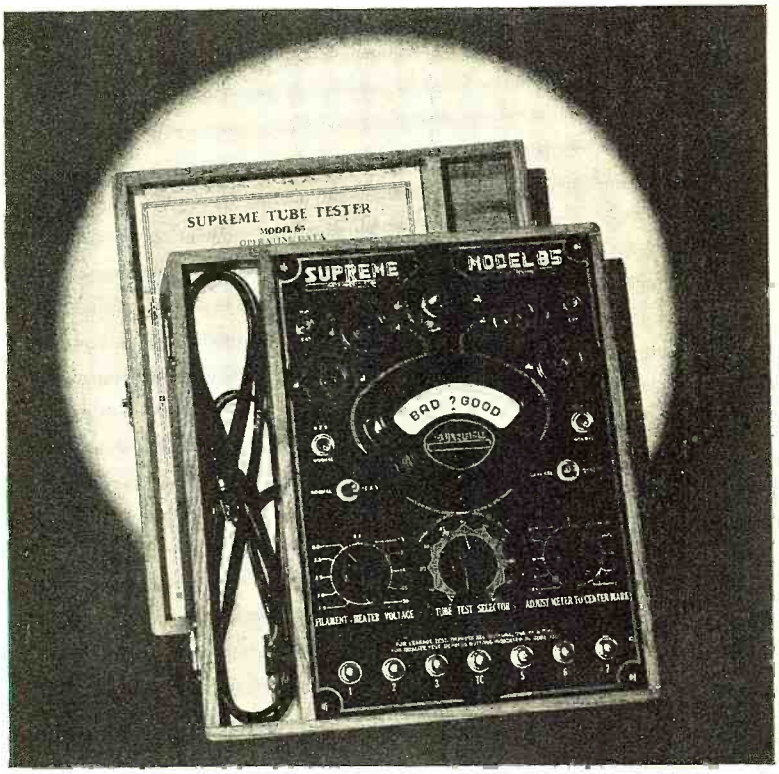
AND NOW! $12 CONDENSER ANALYZER ADDED TO SUPREME 85 "NEONIZED" TUBE TESTER AT NO EXTRA COST



Shorts and leakages in capacitors have been responsible for many a kick-back on repair jobs which apparently checked 100% when they left your lab. Baffling faults in Automatic Volume Control circuits that finally caused a trip of the set back to the factory, or the replacement of every capacitor in the circuit, have had the root of their trouble in capacitor leakages that not even a high-range ohmmeter could detect. Knowing this, alert radiomen are now awake to the fact that a 100% job of modern servicing must include a complete condenser (or capacitor) analysis.

And Supreme—the organization of practical radio servicemen and engineers—now gives it to you. Includes it as a still further distinction to the most distinguished tube tester in radio service work. Think of it, a $12.00 condenser analyzing equipment is now incorporated as standard design in SUPREME 85 "NEONIZED" TUBE TESTER. Without a penny of extra cost!

Now that famous, unerring Neon light provides analysis of capacitors as well as of tubes. Positive detection of leakages, shorts, opens. Every desired test of any capacitor, regardless of size.

And every serviceman can well afford to modernize with the SUPREME 85. Not only because it is low in first cost, but particularly because it soon returns first cost and plenty more besides, and because it puts your service on a 1935 plane, giving you a 3 in 1 Tester, namely (1) TUBE TESTER; (2) TUBE LEAKAGE TESTER; (3) CONDENSER ANALYZER . . . at the price of one.

As part of its service to Supreme owners, and realizing that its own reputation is built on the reputation of the users of its instruments for a progressive service, SUPREME makes this high-class condenser analyzer equipment available to present owners of Model 85 at nominal cost. Write for information.

DEALERS NET CASH WHOLESALE PRICE **$39.95**

Saltville, Va., Nov. 16, 1934.

SUPREME INSTRUMENTS CORPORATION,
Greenwood, Miss.

Gentlemen:

I would like to say just what I told an important customer the other day. This customer being quite a radio man himself had fully realized the joy of radio and had purchased a Stromberg-Carlson Telektor outfit with a Capehart Automatic Phono. The receiver had been performing beautifully until recently when there was a hum setup in the set. I was called on to service this receiver and to my dissatisfaction I did not find this trouble. However, I advised my customer that I had some new testing equipment coming and would make another checkup. He agreed to wait and here is where SUPREME came in. The first thing I did was to recheck the tubes. The fourth tube checked, made my heart leap. The Neon light lit up oh so beautiful. I then noticed the button to see what part of the tube was shorted and found the filament shorted to the cathode. I could easily see the hum trouble then. And a new 27 installed corrected the trouble. My remark to the customer was, that I believe I would send Supreme Company another $25.00, as the instrument was worth a lot more than it cost.

Supreme has helped the serviceman, and the serviceman should be glad to help Supreme. You may count on our shop being a fully Supreme booster. We contemplate ordering another DeLuxe 333 within the next few days.

Very truly yours,

E. R. Arnold,
RADIO SERVICE SHOP.

MANY THANKS, MR. ARNOLD.
NEVER MIND THE "EXTRA $25."

"The Neon Light Lit Up . . . Oh So Beautiful, I Could Easily See The Hum Trouble Then."

Actual experience of radio men is the soundest evidence of the new paths in service accuracy blazed by the SUPREME "NEONIZED" 85 TUBE TESTER. Witness the letter herewith from Mr. E. R. Arnold. Typical of untold others. Buy the tube tester that gives you most in satisfied customers . . . at no extra cost.

Ask your jobber for a demonstration of this most outstanding tube tester in radio service work and other Supreme instruments. Send accompanying coupon for complete 1935 Catalog.

SUPREME Model No. 35 Tube Tester } **$29.95**
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SUPREME Model No. 333-DeLuxe Radio Analyzer **$39.95**

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BACKSTAGE IN BROADCASTING

GEORGE GERSHWIN

BETTY JAYNE

B. A. ROLFE

PEGGY FLYNN AND CHARLIE KING

Chatty Bits on Radio Personalities

Samuel Kaufman

IT seems that most successful girl stars we meet around the New York network studios are natives of distant towns and cities, but Lucille Peterson, the brunette songster who is heard on George Gershwin's CBS periods was born in the American metropolis. Her first love was the piano but she was overheard singing by a casting agent and soon found herself prima donna of a Broadway revue. This was followed by a tour of movie houses and, in turn, by a radio engagement in Detroit. Countess Olga Albani and Frank Parker are two radio stars whose encouragement helped her in the following a musical career.

RECENT weeks brought about some new arguments on whether American broadcasting should or should not be Government operated and whether a large proportion of the available channels should be allocated to colleges and universities. The Government hearings in Washington and the annual convention of the National Advisory Council on Radio in Education in Chicago brought to light the opinions of many experts in varied fields. Concerning the demands of certain educators for one-fourth of available channels, we think Dr. Walter Damrosch deals with the subject soundly in his following statement: "I have grave doubts as to the ability of such educational institutions to make any contributions in this direction which would improve or even approach the musical programs now presented over the air. How would they obtain the enormous amount of money necessary to present such programs? How would they finance a program such as our (NBC) Friday morning school concerts, our four weekly chamber music concerts, our operatic broadcasts and choral performances? Where could they find the necessary symphonic orchestras and artists which now constantly appear on our programs?"

DR. WALTER DAMROSCH

BETTY JAYNE, a young songstress from Buffalo, New York, has been assigned a Tuesday, Thursday and Saturday broadcasting spot on the new American Broadcasting System network. Her first public appearance was at a high school concert where Loretta Clemens, NBC star, heard her and arranged an initial microphone engagement. That was three years ago. Now, at twenty-one, Betty has earned a featured spot on the newest major network. The ABS is keyed by Station WMCA, New York, and is lining up a promising roster of radio artists.

"ONE MAN'S FAMILY"

THE sustaining program "One Man's Family," long an outstanding NBC feature, has caught the attention of an alert sponsor and is now in the commercial ranks. With the addition of the sponsor, the makers of Kentucky Winners Cigarettes, the feature was switched from a Saturday to a Wednesday schedule. The drama of daily life in an average American family is unfolded in this meritorious series authored by Carleton E. Morse. The programs originate in the San Francisco NBC studios. The cast includes Anthony Smythe, Minetta Ellen, Kathleen Wilson, Michael Raffetto and Bernice Berwin. Another NBC feature to obtain a sponsor is "Vic and Sade," a Chicago studio presentation. The Procter & Gamble Company is presenting the feature daily, excepting Saturday and Sunday. Art Van Harvey, Bernardine Flynn and Billy Idelson are starred in the series from the pen of Paul Rhymer.

EARLY bird radio fans who flip the receiver on while dressing, shaving and breakfasting heartily welcomed a type of program to the air that was previously heard only in evening hours. B. A. Rolfe and a 30-piece orchestra, plus the comedy team of Ed East and Ralph Dumke (Remember the Sisters of the Skillet?) are stars of the Tuesday, Wednesday and Thursday NBC 7:45 a.m. (E.S.T.), broadcasts. The programs run 45 minutes, presenting familiar tunes and a type of humor that goes well during the morning hustling. There is a time announcement every five

VICTOR KOLAR AND HENRY FORD

www.americanradiohistory.com

MARY COURTLAND

minutes so that you won't be able to blame the program for being late to work.

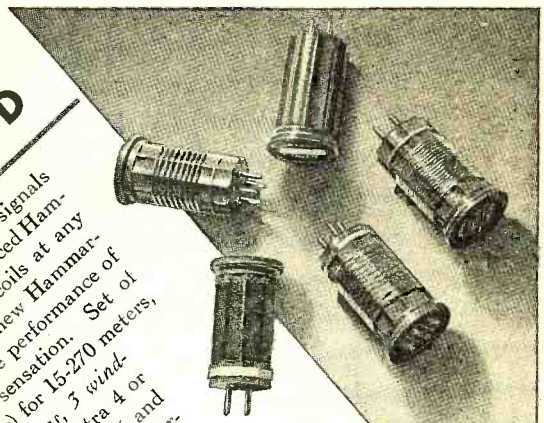
CHARLES KING and Peggy Flynn, musical comedy performers, are co-starred in the new Tastyeast series Sunday nights over NBC. King was a big stage success in the pre-talkie era having been featured in "Little Nellie Kelly" among other productions. He registered favorably in "Broadway Melody," one of the first musical talkies. Although heard from time to time as a guest star on radio programs, this is his first weekly series. Miss Flynn, whose stage name is Peggy Bernier, appeared in "You Said It" and other musical stage productions.

A NEW high mark in musical broadcasting was set this season. The Sunday night Ford and General Motors presentations over CBS and NBC respectively were notable contributions to the network schedules. The guest star rosters of both series were filled with names eminent throughout the world for concert and operatic successes. One unfortunate angle, though, was that both programs went on the air at the same time, forcing listeners to hear just one or the other—but not both. The point is that they were both worth hearing. Another musical highlight of the season was the launching of the winter series of Voice of Firestone Concerts on NBC Monday nights. On alternating schedules, the series features Richard Crooks, tenor; Gladys Swarthout, Mezzo-soprano, and Nelson Eddy, baritone. Miss Swarthout and Mr. Crooks had previously

(*Continued on page* 517)

FRANK McINTYRE

New Low-Loss COIL SETS and COIL FORMS by HAMMARLUND



USERS say they get more stations, louder signals and sharper tuning with these low-priced Hammarlund Coils, than with any other coils at any price. Perfection of "XP-53", the new Hammarlund low-loss dielectric, makes the performance of these coils the season's radio sensation. Set of four coils (*4 prongs, 2 windings*) for 15-270 meters, $3.00. Set of four coils (*6 prongs, 3 windings*) for 15-270 meters, $3.75. Extra 4 or 6-prong coil for broadcast band, $1.25 and $1.50 respectively. *40% discount to experimenters.*

No artificial coloring to cause losses in Hammarlund "XP-53" Coil Forms. Ribbed for air-spacing. Easy-grip flanges and handy "Meter-Index" inserts for recording coil ranges. Coil Forms (*4 or 5 prongs*), 35c each. 6-prong forms, 40c each. *40% discount to experimenters.*

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424-438 W. 33rd St., New York, N.Y.

Check here *and attach* 10c for Hammarlund 1935 Short-Wave Manual, describing most popular circuits of past year
Check here for FREE new 1935 Catalog.

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Address.....
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Nine months ago, the Hallicrafters *introduced the SKYRIDER—recent imitators still fail to offer all these exclusive SKYRIDER features . . . .*

THE Hallicrafters SKYRIDER, introduced nine months ago, was the first compact, efficient communication receiver to offer truly professional standards at a reasonable price. Today the Super SKYRIDER maintains that leadership.

Note its use of four short-wave bands instead of three, which increases the LC ratio 33%—greatly improving the signal to noise ratio. Note, too, that though the Super SKYRIDER has a measured overall sensitivity greater than any receiver, the I. F. transformers are operated at only 50 micro-volts—an indication of its tremendous sensitivity in the R. F. stage.

Note these other features: the built-in speaker and power pack—pre-selection—the unusually wide band spread—the vibrant power. Write today for full information.

Check These Features

BUILT-IN POWER PACK AND SPEAKER
4 SHORT-WAVE BANDS
7" BAND SPREAD ON 40 METER BAND
PRE-SELECTION
NO PLUG-IN COILS
LESS THAN 3 MICROVOLTS SENSITIVITY
3 WATTS POWER OUTPUT IN THE SPEAKER
TONE CONTROL
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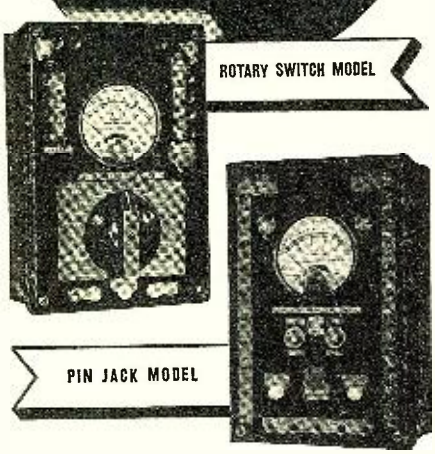

Both models illustrated use Weston Socket Selectors

The demand for Weston Selective Analyzers proves conclusively that dealers and service men are finding it highly profitable to use nothing but a quality, life-time analyzer. This selective method of analysis, introduced by Weston, now is standard practice among radiomen everywhere.

To suit all requirements, two types of the famous Model 665 now are available. Type 1 employs a rotary switch for the selection of ranges . . . while Type 2 has a series of pin jacks and is offered at much lower cost.

Both types have the same broad list of ranges, and combined with the Weston Socket Selector Set are truly universal in their capacity to analyze radio receivers. A bulletin is available giving complete information on these life-time analyzers. Return the coupon today . . . Weston Electrical Instrument Corporation, 615 Frelinghuysen Ave., Newark, N. J.

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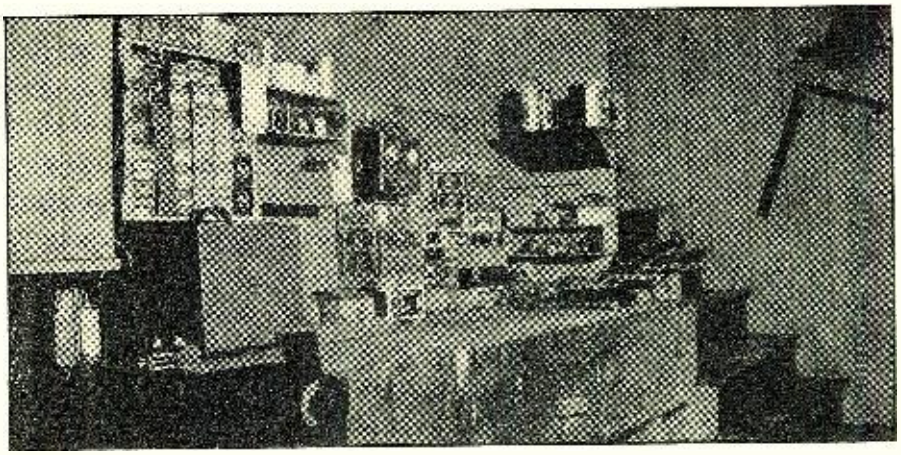


THE SERVICE BENCH

ZEH BOUCK

THE SERVICEMAN AND HIS LOCAL ORGANIZATION

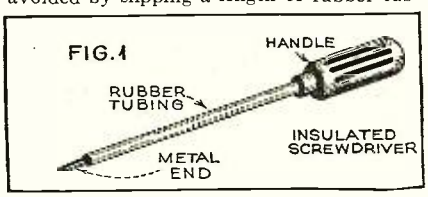
YOU can't keep a good serviceman down, but he'll get along a lot more rapidly if, as we have suggested before, he boosts his Local Service Organization, shares his trials and triumphs with his fellows, and, in return, takes every advantage of their pooled knowledge and experience. The Greater Bridgeport Radio Servicemen's Association is an inspiring example of how rapidly progress can be made through co-operative efforts. This organization came into being just slightly over a year ago, at a time when many servicemen felt that the depression had them licked, and were about ready to trade in their test-sets for a hitch-hiking outfit. These affiliated servicemen have prospered to such an extent that, just one year later, a first annual banquet was held at one of Connecticut's most exclusive taverns. Well on to two hundred active servicemen attended, as well as a score or two of out-of-town guests prominently identified with various phases of radio—from engineering to sales. Continuous entertainment was provided, and the Mayor of Bridgeport thought enough of the organization to appear personally and assure the crowd that their efforts were rapidly raising the status of the serviceman to that of a profession. Door prizes, the value of which totaled several hundred dollars, were contributed by manufacturers and local dealers. They ranged through velocity mikes, power transformers, test instruments and a set of Rider manuals to last (but we hope not least) a two-years subscription to RADIO NEWS. Door prizes, by the way, are also distributed at the regular meetings of the Greater Bridgeport Radio Servicemen's Association. This has proved to be an excellent stimulus to attendance. (*Your service editor was fortunate enough to attend the banquet, and somehow or another squeezed into the photograph of the speakers table*).

Servicemen in other parts of the country should take the hint from the Bridgeport "gang," and not neglect the promotion possibilities of a service organization.

The relationship between the manufacturer and the servicemen organizations should be one of mutual co-operation—the manufacturer supplying all necessary data for the servicing of his receivers, and the organized servicemen studying and really assimilating this information so that good servicing jobs will be assured when the occasions arise.

THE DAY'S WORK

We'll start out this month with a couple of kinks that will contribute their little mite to quick and successful servicing. The insulated screw-driver seems to have an unlimited variety of forms, and George Mark, of Los Angeles, California, is responsible for that of Figure 1. He writes—"Some radio adjustments have to be made on the receiving set when in operation. If an ordinary screw-driver is used for making such adjustments, there is always the danger that the long metal shaft will short over to some live part of the circuit with all possibilities of minor disaster. The possibility of such trouble can be easily avoided by slipping a length of rubber tub-



ing over the shaft so that only the tip projects."

Our old "standbi," Frank W. Bentley, of Missouri Valley, Iowa, who "kodaks as he goes," sends us the photo of Figure 2, which will be of interest to the rural serviceman, as well as others who have occasion to hook up dry cells. These jumpers are harness belt or strap fasteners, and

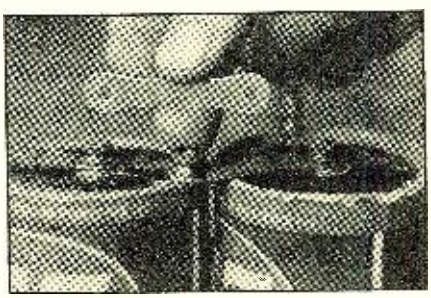


FIGURE 2

can be procured cheaply from any harness shop or hardware store in the proper size. They make a more satisfactory, convenient and permanent connection than is possible with wire.

THIS MONTH'S SERVICE SHOP

R. O. Lamb, manager of the Lamb Radio Service, Wilkinsburg, Pa., is a familiar contributor to this department. It is with

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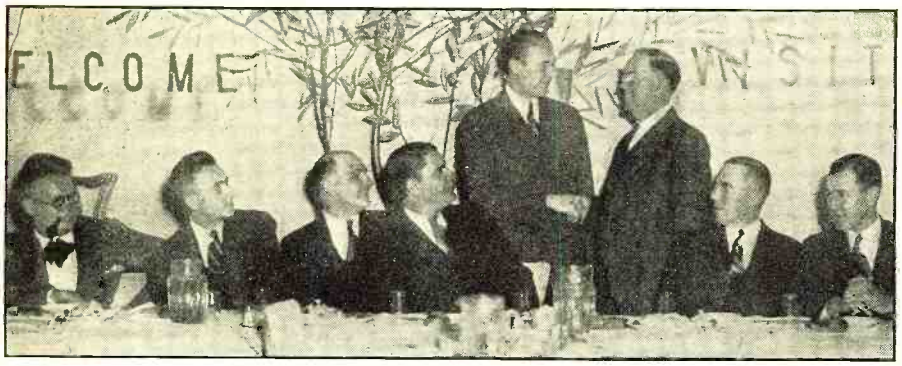


THE SOCIAL SIDE OF SERVICING

Speakers table at the first annual banquet given by the Greater Bridgeport Radio Servicemen's Association. John Rider being greeted by the president—your service editor at the left

consequent pleasure that we show his Service Shop, in this month's heading. All the usual equipment is there, plus a good stock of tubes and a husky bench. Mr. Lamb specializes in convertor troubles.

While on the subject of personalities, we are glad to take a good look at John Nisslein, also a regular help in making up the *Service Bench,* whose general contours are

FIGURE 3

observed in Figure 3. Philcos and automobile radios are his specialty.

Service Notes

—from E. M. Prentke, of the Prentke Laboratories, Cleveland, Ohio—"Some dope on volume control replacements. The Simplex, model R, volume control can be replaced effectively with the Centralab No. 52,205. General Motors superheterodynes, models 120, 130 and 140, chassis A and B. To replace volume controls efficiently, use Centralab No. 74-602, one side to the antenna and the other to the screens of the '24's. The performance of the Silver-Marshall model R can be decidedly improved by replacing the volume control with a Centralab No. 62-110."

Servicing Majestics

Morris Chernow, of New York City, our walking encyclopedia on Majestics, sends through the following items from his service note-book. Referring to models 460 and 440, he writes: "When no plate voltages are indicated on the 460 set, look for an "open" in the 10,000-ohm section of the candohm voltage-dividing resistor, shown as R14 in the circuit diagram. No signals, though all voltages test okay. Look for an open coupling condenser between the –55 tube and the control grid of the 2A5. This is a tubular type of .03 mfd. capacity and is located underneath the candohm voltage divider resistor. In the 440 set, a completely dead receiver may be due to a defective 6Z5 tube which has an annoying habit of failing quite often. Later models of this receiver come equipped with a one ampere fuse in the transformer primary circuit for the purpose of preventing transformer burn out with a defective 6Z5 tube. (Better install such a fuse if you run across one of the earlier sets.—Ed.) Oscillation in this set is almost always due to a defective 6F7 tube, which is quite critical in operation in this receiver. Motorboating is caused by an open in the 1-megohm resistor located in the grid return of the triode section of the 6F7 tube, shown as R_6 in the circuit diagram. Look for an open 41 cathode resistor when a high-plate voltage is indicated on all tubes, with no signal coming through. The correct value is 500 ohms, and when open the plate voltages rise to over 300 volts. Failure of the tube to oscillate may be caused by a rosin connection on the third grid return resistor (150,000 ohms) in the 6A7 tube circuit. Go over the connection with a hot soldering iron. With the model 800 Majestic, the only chronic failure is due to the opening of the 10,000 ohm section of the candohm voltage divider resistor.

"The following notes apply to the model 400 Majestic: When the set seems to have plenty of r.f. pick-up, but very low volume on all stations, look for an open speaker field coil. For some reason these open quite frequently, and the only cure is to replace them. When no signal is obtained from the first 57-A detector-oscillator tube, although the i.f. and other tubes are alive, test for a grounded i.f. transformer. There should be no reading from the control grid lead of the i.f. 58-A tube to the transformer can. The transformer need not be replaced. Simply remove the coil, wrap fish paper around it, and put it back into place. If the set is completely dead at the grid of the 43 output tube, the chances are that the C bias resistor in the cathode is open. This is of 700-ohms value. Another possibility, though less probable, is a defective 43 tube. (The electrolytic condenser across this bias resistor occasionally shorts out, causing a pronounced hum.)

"In the 400-A series, which utilizes the same circuit and layout, only employs two 6D7's and a 6E7 instead of the 58-A's and the 57-A tube, trouble is often encountered, the symptom being a gurgling type of hum. Replacing with a new 6D7 tube in the detector socket will usually cure it. Sometimes you will have to try as many as a half dozen tubes before you will find one which will eliminate the hum. Intermittent reception which can be controlled by

(*Continued on page* 525)

Shhh! Shhh!

QUIET *Please!*

Individually **TESTED** *for* **NOISE**

You Can't Hear Noise, Because It Isn't There!

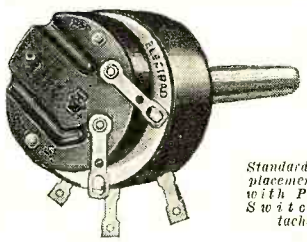
HERE IS THE SECRET of

ELECTRAD'S New QUIET VOLUME CONTROL

THE resistance element is baked on the flat outer rim of a rigid Bakelite ring. Over this, the special-alloy floating contact gently glides in a straight path.

Result: the smoothest, quietest, longest-lived replacement volume control ever devised. Absolute quiet is further guaranteed by *individual testing* of each control at the factory.

The molded Bakelite case, with removable metal end-cover, projects back-panel only ½ inch, when mounted. New-type power-switch (*approved by underwriters*) attached by a single screw. Extra-long, easily-cut aluminum shaft. Made in all standard sizes.



Standard Replacement Unit with Power-Switch attached.

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If you prefer critically designed amplifiers reflecting present-day economy with remarkable quality, then consider KENYON *Versatile* Amplifiers offered in kits or individual components. 18 or 36 watts power output. Frequency response plus or minus 2 db from 100 to 8000 cycles. Voltage gain of 80 db. Complete two-circuit, four-position mixer integral with audio channel. Audio and power chassis on separate decks.

Kit 245 AB (18 Watts)

Transformer Components Only, List..... $51.35

Kit 445 AB (36 Watts)

Transformer Components Only, List..... $62.60

Accessory components are mounted to respective chasses at factory. Accessory kit does not include mixer T pad attenuators. Accessories for either the 18 or 36-watt unit, complete (list price)..... $54.50

If rack and panel mounting is preferred to table mounting, the accessories total $12.00. If technician prefers to select own accessories, two chasses may be purchased separately, together with tube cover and mixer cover plates and voltage amplifier cradle suspension for $20.00

Ask your dealer for a copy of Engineering News No. 10 describing this unit in detail.

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RADIO PHYSICS COURSE

ALFRED A. GHIRARDI

Lesson 37

Capacity of Condensers

THE capacity of a condenser for storing electrical charge is called its *capacity* or capacitance. The term "capacity" is probably in more common use than "capacitance." Since the quantity of electrical charge (electrons) which can be stored in a condenser of given size depends upon how much e.m.f. or "pushing force" is applied to keep the electrons crowded into the negative plate against the force of their mutual repulsions. it is only natural that the unit of capacity or capacitance should be defined in terms of not only how much charge is stored, but also on how much voltage is applied. The unit of capacitance is the *farad*, named after Michael Faraday, and is defined as: the capacitance of the condenser in which an applied e.m.f. of one volt will store one coulomb (6.28×10^{18} electrons) of electricity; or vice versa, the capacitance of a condenser whose voltage is raised one volt when one coulomb of electricity (6.28×10^{18} electrons) is added to it.

The farad is a very large unit, since a condenser having a capacitance this large would be very large in physical size. The condensers dealt with in ordinary electrical and radio work have capacitances of millionths of farads or *microfarads* (abbreviated mfd.). A smaller unit yet, the micro-microfarad, is commonly used in radio work in connection with very small condensers. This is equal to 10^{-12} farads. Another unit used extensively in Europe is called the *centimeter of capacitance*. It is equal to 1.1124 microfarads.

The capacitance of a condenser depends entirely upon three main things: (1) the "total" surface area or size of the plates, (2) the separation of the adjacent plates or the thickness of the dielectric between them and (3) the kind of dielectric or the nature of the material between the plates. Let us see just how and why each of these factors affect the capacitance.

Suppose an e.m.f. of one volt is applied to the condenser shown at the left of Figure 1. We will assume this to have a capacitance of one farad, and to have two plates, each of one foot square. Then 6.28×10^{18} electrons will be transferred around from the plate A which becomes positive, to the plate B which becomes negative. These will distribute themselves uniformly over the entire surface of the negative plate and their combined charge will act on the dielectric. Now, suppose that we had the condenser shown at the center, with the plates 2 feet by one foot each (twice as much area), and apply one volt to them. Since the transferred electrons can now spread over a surface twice as large, twice as many electrons can be transferred around from plate A to plate B before the electric charge builds up to a sufficient *intensity* to equal the applied e.m.f. and stop the transfer of electrons. Thus, doubling the area of the plates doubles the electron charge stored for a given applied voltage, that is, doubles the capacitance. In most commercial condensers instead of having just two very large plates to obtain the required amount of capacitance, the condensers are built up more compactly with alternate layers of plates and dielectric, and the plates are connected as shown at the right of Figure 1. All the positive plates are connected to form a common positive terminal, and all the negative plates are connected to form a common negative terminal as shown. Both sides of each plate are effective in acting on the dielectric between the plates. Condensers of this type may be built in very compact form.

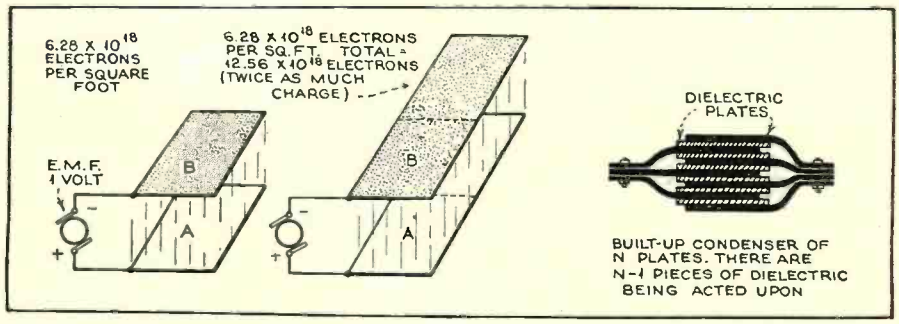

Figure 1. The capacitance of a condenser is proportional to the surface area of the plates, since the larger the surface area is the more space the transferred electrons have to spread over. Mica-type condensers have alternate sheets of tin foil and mica stacked up as shown at the right to form compact condensers.

Capacity Varies with the Spacing

If the distance between the plates is decreased one-half, the thickness of the dielectric is decreased one-half, and the capacitance is increased, for then there are only half as many electron orbits in the dielectric to be deformed by the electric forces of the electrons. Hence the electrons being crowded into the plate which becomes negative must only act against half as much opposition from the electrons in the dielectric and a given applied e.m.f. can crowd twice as many electrons into the negative plate, resulting in twice as much stored charge and twice as much capacitance. The thickness of the metal plates themselves has no effect on the capacitance. The plates are usually made as thin as possible in the various types of condensers, so as to make the condenser compact. How thin the dielectric can be made depends upon how thin it is physically possible to roll out the particular dielectric material used and also what voltage the dielectric must be able to safely withstand. As we shall see later, the thinnest dielectric used in practical condensers is the aluminum oxide and gas film which is formed in the electrolytic condensers. This makes it possible to build electrolytic condensers of large capacitance in very small spaces.

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The "Ham" Shack

(*Continued from page* 498)

be blessed with the space for such antennae. In general, its length is not critical. The usual practice is to make it 23.7% of its length in meters (i.e., length in meters divided by 4.2). Wavelength (in meters) may be determined by dividing the frequency (in kc.) into the velocity, 300,000. That means 125 feet will be adequate for the 150-meter band. On the other hand, it will be seen that the 80-meter Hertz will form an excellent quarter-wave (Marconi) antenna, when operated against a counterpoise or ground.

Calls Heard

By Lewis F. Miller, 4614 North Paulina Street, Chicago, Ill. On 20-meter 'phone: LU8BR, PY2AK, TI2EP, K4SA, K6BAZ, VP6MR, HI8X, HI7G, HI6S, CM6XS, CM2SE, CM2QY , CM2WZ, CM2AN, CM2SV, CM2RA, CM2LL, CM2JM, X1G, X1AI, X1AX, X1BR, X2N, VE4BF, VE4IG, VE4HW, VE4DU, VE4GO, VE4LL, VE4KX, VE4FI, VE4CY, VE4HQ, VE4EA, VE2GK, VE2BG, VE2DX, VE2CH, VE3XQ, VE3GK, VE3CF, VEGS, VE3JG, VE3HC, VE1CO, VE1DR, VE1BV and VE5CP. Mr. Miller reports hearing more than 750 amateur stations in the United States in every state in the Union.

By M. Mickelson, P.O. Box 2754, Bloomington Station, Bloomington, Minn. On 20-meter 'phone: K6UA, K6CMC, K6BAZ.

By N. C. Smith, Forge House, High Street, Foots Cray, Sidcup, Kent, England. On 20-meter 'phone: FM4AA, RW59, W3GDL, W2ZP, K4SA, F3BN, I1KG, W2GOQ, G6VP, VE5FY, W1GPE, W2AIE.

By Sam J. Emerson, 1097 Galewood Drive, N. E., Cleveland, Ohio: Heard on several bands: HI6F, HI7G, HI8X, X1G, CM2WZ, CM6XS, VE4HQ, VE2EE, OA4B, CM2AN.

Television Scanner

(*Continued from page* 467)

results in power savings which Mr. Pries computes to be of the fourth magnitude—i.e., one ten-thousandth of the power that would otherwise be required. In the scanner as built at present, for example, the wire builds up a twisting moment at the mirror of about eight degrees—more than enough for television requirements—with an applied power in the coil of less than one-half watt. The tilting motion of the frame is likewise required with a power of only five one-hundredths of a watt. Since the required power is so small, Mr. Preiss proposes that it shall be obtained directly from the receiving amplifier, by the building up of a pulse sent over the air, thus assuring exact synchronization of the receiver with the transmitter, and doing away with all necessity for driving motors, high voltage transformers, or anything of the sort.

The scanning units built by Mr. Preiss, and illustrated in the accompanying photographs, are small and rugged, and cost about as much to build as does a good dynamic speaker. Test models have been operated through several billion swings of the scanning mirror without showing the slightest trace of deterioration, since the entire action is obtained through the inherent elasticity of the various parts of the unit, without dependence upon any bearings or other similar devices.

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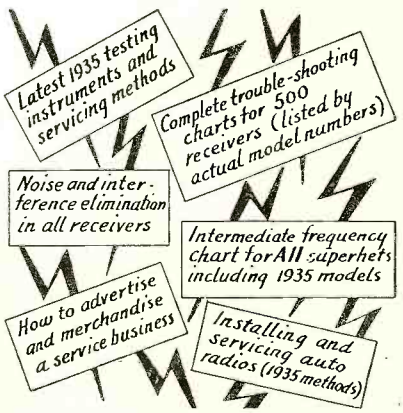

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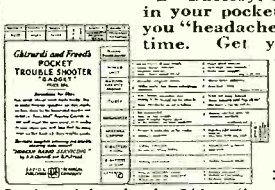

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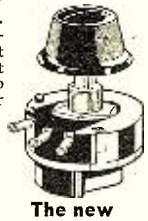

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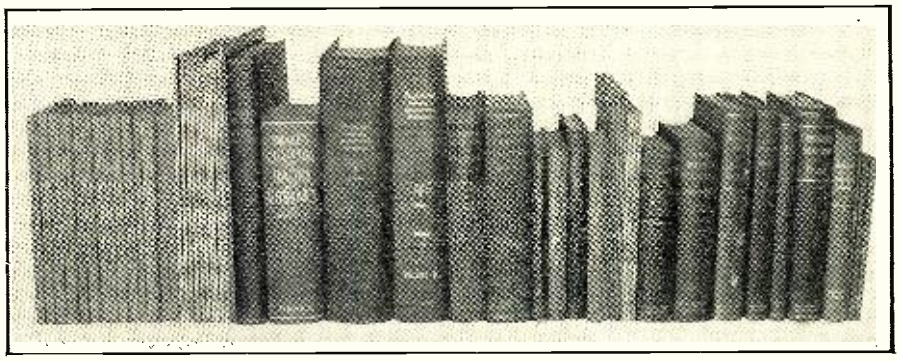

THE TECHNICAL REVIEW

JOSEPH CALCATERRA

Servicing Superheterodynes (Revised Edition) by John F. Rider, published by John F. Rider. This is a book, intended for the serviceman, which treats of the principles of modern superheterodynes and the troubles which are most likely to be met with, their causes and cures. The new edition amounts to a new book since there have been so many new developments which needed explanation. Multi-element tubes, a.v.c. circuits, q.a.v.c. circuits and the various tuning indicators are also among the subjects. Of course, oscillators, mixer circuits, i.f. amplifiers and second detectors are the main subjects. The text is written clearly enough so that no serviceman should have difficulty learning to understand the working principles of even the most complicated superheterodyne. Several of the opening chapters are devoted to the phenomenon of beats. It tells how one gets the beat that is wanted and how it is that there are so many beats that are not wanted. Then follows a review of the various kinds of supers, such as the "standard super," the "autodyne," the "second harmonic system," etc. Then the author starts from the antenna and works toward the output, explaining all the variations of pre-selectors, oscillator-mixers, i.f. amplifiers, second detectors, a.v.c., q.a.v.c. and tuning indicators. He also tells what the causes of the most frequent troubles are. The final chapters contain a tabulation of possible troubles with their remedies, arranged by their symptoms, such as: dead receiver, interference, noise, distortion. There is also a complete guide of the use of oscillators and how to align the super.

Ghirardi and Freed's Pocket Trouble-Shooter "Gadget," Radio Technical Publishing Co., 1934. This is a card index consisting of 7 cards fastened together at one corner but so that they can turn. The cards are so arranged that one can look for a symptom, open the cards at the right place, and find the possible causes of the trouble. These causes are again grouped under headings such as: Power unit, receiver circuits, tubes, etc.

If the writers of these books and indexes get much brighter it will be possible to find the trouble in any receiver without thinking.

Une nouvelle mêthode de détection—La lampe frein. (A new method of detection —The "Brake" tube). An article appearing in Toute La Radio for November 1934. "Like Caesar's wife, the detector has always been above suspicion." That is how it begins. The article discusses a new detector consisting of a triode with the grid connected to the high voltage and output, the plate to the r.f. circuit with proper bias. The theory is that all the electrons emitted will travel to the grid but when the plate becomes positive, it will absorb some electrons, robbing the grid. A correct plate voltage can be chosen so that rectification takes place. The bend of this characteristic is so sharp that detection is linear even for small signals. Placing a condenser between grid and plate relieves the input circuit of a load. So we have a linear detector with no load on the tuned circuit.

General Short-wave and Public-Address Manual, by Sydney Bass and Herman Cosman. This is a compilation of articles, tables and other data on the design and construction of short wave receivers and public address amplifiers. Most of this information has been collected from various publications and literature issued by manufacturers.

The Hammarlund Short-wave Manual. This manual contains a collection of descriptions of the best and most popular inexpensive short-wave sets published in the leading radio magazines and selected by the editors of these magazines. Diagrams, lists of parts and picture wiring diagrams are shown with the corresponding lists of parts. All these sets will work with the Hammarlund plug-in coils and the ranges are indicated.

Review of Articles in the November, 1934, Issue of the Proceedings of the Institute of Radio Engineers

An Experimental Television System, by E. W. Engstrom, R. D. Kell, A. V. Bedford, M. A. Trainer, R. S. Holmes, W. L. Carlson, W. A. Tolson and Charles J. Young. A description of the transmitter, transmitter terminal equipment, receiver and New York-to-Camden radio relay circuit used in the experimental television system at Camden, N. J.

The Sound Prism, by O. H. Schuck. A description of the theory and operation of a new rapid-acting heterodyne wave analyzer called the "sound prism" which permits changes in the frequency spectrum to be followed by the eye as the composition of the sound changes, and the ear hears the change in quality.

Review of Contemporary Literature

Some Principles of Transposing Open-Wire Lines, by A. G. Chapman. Bell Laboratories Record, November, 1934. A discussion of the various factors which produce crosstalk in telephone lines and the manner in which these tendencies are overcome by transposition systems.

A High-Speed Level Recorder for Acoustic Measurements, by E. H. Bedell.

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Laboratories Record, November, 1934. A description of a level recorder, recently developed by the Bell Laboratories, which records levels on a logarithmic scale over a range of 90 db., and is able to record higher rates of change than has been possible heretofore.

Gas-Filled Thermionic Rectifiers, by S. B. Ingram. Bell Laboratories Record, November, 1934. An explanation of the effects produced by the use of gas in the operation of thermionic tubes and a discussion of the advantages to be gained by the use of gas in thermionic rectifiers.

The Regenerative Circuit Litigation, by Alfred McCormack. Air Law Review, July, 1934. A summary, with comments, on the history to date of the most important case in radio litigation.

Radio Wave Propagation, by E. C. S. Megaw. The Wireless Engineer & Experimental Wireless, November, 1934. A description of a simple and compact apparatus for demonstrating the principal phenomena of ultra-short-wave propagation using wavelengths of the order of 10 to 30 cm.

Design of Constant Resistance Attenuators, by T. S. Rangachari. The Wireless Engineer & Experimental Wireless, November, 1934. A simple mathematical treatment of the design of constant resistance attenuators for use as volume controls and transmission measurements.

Radio Interference Must Go! Electronics, November, 1934. An announcement of the plans being made by the IRE and RMA to eliminate radio interference.

Electron-Tube Voltage Control for Photometry, by F. E. Kilpatrick and Carl P. Bernhardt. Electronics, November, 1934. Describes the use of electronic voltage regulators for applications where a power source of unvarying voltage is required.

The Directive Antenna at KA1NA, by D. C. Redgrave. QST, November, 1934. Gives detailed description and working data which will enable anyone to build a directive antenna similar to the one in use at KA1NA.

DX Zones of the World. R/9, November, 1934. A simplified type of DX map which can be used as a yardstick of DX transmission and reception.

Selectivity Measurements, by Edward N. Dingley, Jr. Radio Engineering, October, 1934. Points out how the source of errors in making measurements of receiver selectivity may be eliminated, and measurements made on a more accurate and standardized basis for comparison purposes.

A Study of Acoustics, by Bernard Ephraim. Commercial Radio, October, 1934. A pictorial and analytical explanation on acoustics of sound projection in rooms and auditorium.

Short-Wave Air Transport Communication, by F. C. McMullen. Communication & Broadcast Engineering, October, 1934. Shows a map of airline routes employing two-way radio communication, with locations of ground stations and describes the general equipment and requirements which it must meet for this type of service.

A Study in Dials. Radio Retailing, November, 1934. Illustrations and features of the various types of dials used in current and new models of radio receivers.

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The abstracts of articles featured in this department are intended to serve as a guide to the most interesting and instructive material appearing in contemporary magazines and reports. These publications may be consulted at most of the larger public libraries or copies may be ordered direct from the publishers of the magazines mentioned. RADIO NEWS *cannot undertake to supply copies of these articles. They are NOT included in the* RADIO NEWS *Free Technical Booklet Service.*

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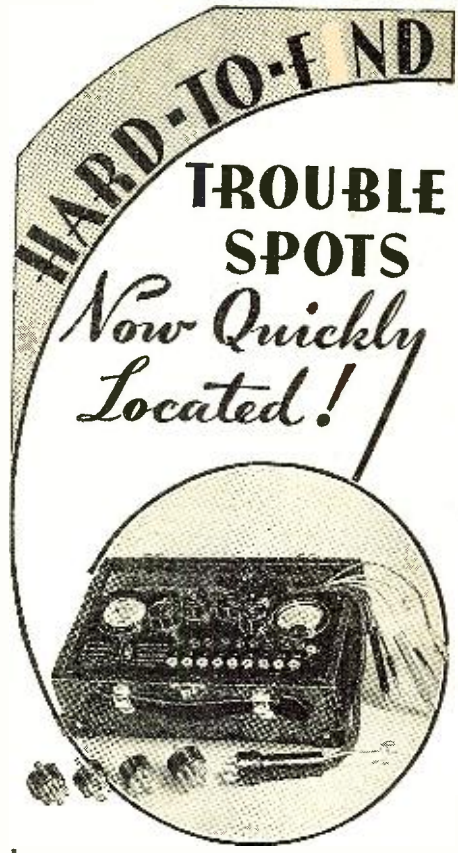
(*Continued on page 522*)



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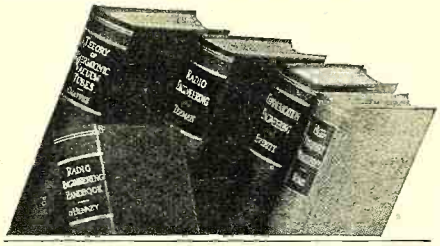

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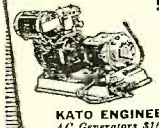

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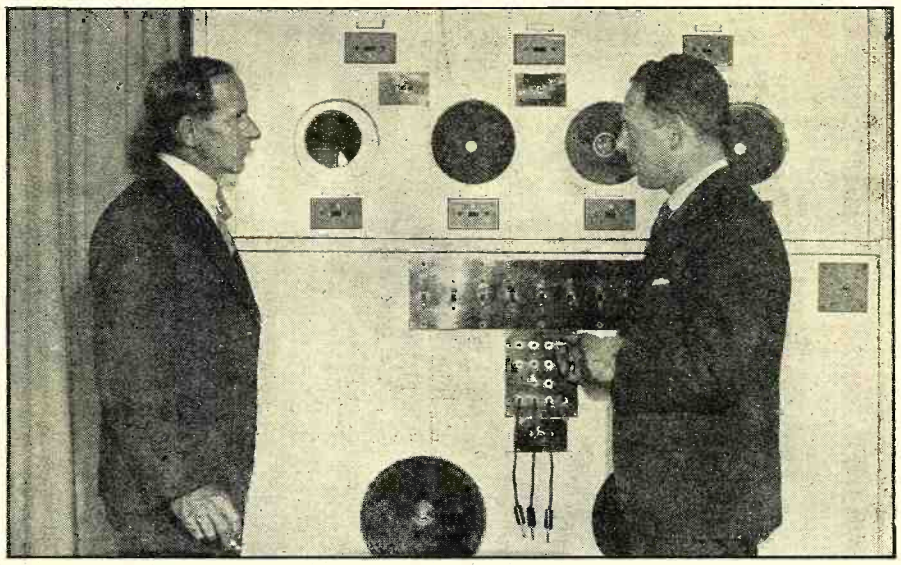

QRD? QRD? QRD?

CONDUCTED BY *G.Y.*

THE New Year celebrations are now all over and we must make a record of the past year's achievements. Due to concerted efforts and a united front, the radio operating profession has gradually achieved a place in the sun as witnessed by the various gradual increases in salaries by shipping companies and better working conditions. Three rousing cheers must be given to the whole-hearted action taken by the ARTA, with special reference to its president, Hoyt Haddock. Nothing could have been accomplished without a guiding hand, an unselfish person with only the welfare of the radio operator in mind. No other type of man should be permitted to control this ship because its destination might be detoured into various channels not in accordance with the best-laid plans. It is to be hoped that the chartered course of this organization will continue to be *the welfare of the radio operator!*

Having the distinction of being the only amateur for thousands of miles around has its compensations. Francis Fleming, VP2FF, Suva, Fiji Islands, shown above (left) with Irving Miller, is happy that he hasn't got the continual breaking-in from other amateurs as we have in America. He has been on the 40-meter band for the last four years, but due to having only 240 watts d.c. current at his disposal, he has but 20-watts output on his transmitter. He is now in this country purchasing new types of receivers and transmitters and states that American products cannot be beat anywhere. Righto! sez we.

From the various speeches being made by engineers, it seems that television has not reached the "corner" as yet, but a new type of facsimile transmitter and receiver may soon be put on the market for commercial use. Instead of receiving figures which will dance by and be forgotten immediately after, as we would have by television, this facsimile stunt will give us a permanent record of what had transpired. Mr. Laurence M. Cockaday, editor of this mag, recently described in an issue of RADIO NEWS a successful test of a facsimile apparatus called the "radio pen" devised by John V. L. Hogan. Pictures and text were successfully transmitted by the apparatus, the receiving equipment of which Mr. Hogan had attached to a small standard radio set. A transmitter of this type has been installed by the Milwaukee Journal WTMJ for experimental purposes.

For the first time on record in maritime history, seamen went out on strike in support of radiomen and helped them win a smashing victory. Seamen on the SS Ruth Alexander, Pacific coaster, mustered on deck after the ship had been held up two hours by striking radio officers and announced they were walking off if the demands of the radiomen were not met. Crews of 12 freighters also prepared to strike in protest over the discharge of the radio officers on their ships because of the increased sea hazard that would ensue. The company protested over the short notice given and an effort was made to recruit "scabs," but this failed entirely and the ship sailed an hour late with three radio officers aboard, all of them receiving a substantial increase in salaries. This shows what concerted action can do, although this column wishes to place itself on record as hoping that although by this means past injustices will be rectified, radio officers should not take advantage of shipping owners in their demands.

In accordance with this column's suggestion in a previous issue, the airways operators, who have been sadly neglected in the past, are now being contacted and organized. We believe that this has been effected due to the various injustices which have been visited upon them by the different airlines. Salaries of airways operators have never been standardized. Some companies have been getting operators for as low as $80 per month and in some cases working them for over 6 months before giving them an increase. There can be no improvement until there is perfect organization and it looks like they are on the right road at last.

A letter was recently forwarded to this column, the contents of which all self-respecting radio officers should take note: " . . . Attention is invited to Article 23, paragraph 1 of the general radio regulations annexed to the International Telecommunications of Madrid, 1932, from which you will note that this applies to both voluntarily and compulsorily equipped ships that normally operate on the frequency bands between 365 and 515 kilocycles . . ." This, of course, means that all vessels are required to carry reliable clocks so that there will be no error for the silence period. This may give some ships' operators a laugh, but it is all too true that many clocks have been wound

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and the time set in a haphazard fashion.

We hear from W. E. Gott, who was, the last we heard of him, holding down a berth at Milwaukee, Wis., pounding a telegraph key far from the salty brine which gave him his education. He reminisces back to the days when he got his First Class ticket from Uncle Sammy back in '17. But it seems that he had very little success in the Navy, because he adds: "I had more success with telephone work and had a job with MSE Varney of laying out and getting into practical operation a miniature phone system such as was being used in the trenches 'over there.'" He wishes to be remembered to all the bunch who were in the outfit at that time. . . .

Police Radio WPGN comes through with a bang, via F. J. Bock, who is holding down chief operator's berth at South Bend. He insists that he has a fine 100-watt xmtr and is now planning to bring into the network WRDS, East Lansing, Mich., and WPDX, Chicago. He says that intercommunication in this way is of great value to the police service. There's no more fun being a thief because these new methods of apprehension are too speedy to even give a fellow a chance to enjoy the ill-gotten fruits of his labors.

Joe Dockendorf, our west-coaster, is getting himself in on the know out in them thar "prune" states and is expecting to ship in some real hot news right off the griddle.

We also have 73 from B.E.G. Graham Goodger, who hails from the far-flung shores of Wellington, N. Z. . . . from Charles F. Johnson, (CJ) who wants to be remembered to the gang at RMCA, especially to Bamberg of Brooklyn. He says the ocean looks mighty blue from down in Dennison, Texas, and hopes to be hitting the high waves as soon as a billet is open for him. . . . The "gateway to the Adirondacks," WIBX, has the most beautiful stationery, upon which Lawry Briggs wants the world to know that he is "plenty happy" being the big meter-and-tube man in that station. Well, we say it sure is pleasant to sit on the beach for awhile, but the yearning to get a rocking deck under one's feet comes to us land lubbers every so often. So, cheerio and toodleoo, and with an ear to the ground for future developments, we say ge . . . 73, GY.

The DX Corner (Broadcast Band)

(*Continued from page 473*)

closed down. The best stations here are WJZ, WABC, WBZ, WTIC and WCAU, and if one of the last three is not coming over at midnight, I pack up and go to bed.

"The Argentines are often good when no U. S. can be heard. The best time is from midnight on. The following were heard this month: LR5, LR6, LR2, LR3, LR4, LS8, LS2. These are all good, LS2 being a wonderful signal at times. LR6 is the weakest.

"Cairo, Egypt, is well heard here, but only when its wavelength partner, Brussels, is silent. This is from about 4-4:40 p.m., G.M.T., on most days. Frequency is 620 and power 20 kw."

—OBSERVER COALES.

Modernization Service on Tube-Checkers

NEWARK, N. J.—The Weston Electrical Instruments Co. recently announced a complete factory-rebuild service on all Weston and Jewell tube checkers and analyzers. Complete details on this modernization can be had by writing to Weston.

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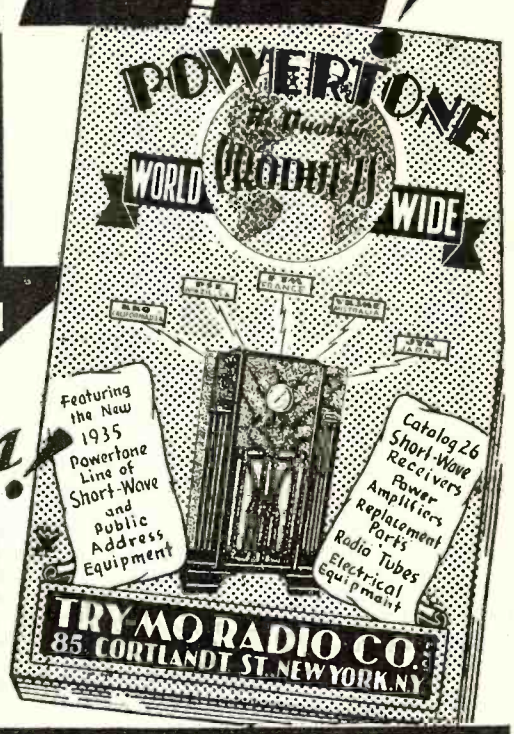

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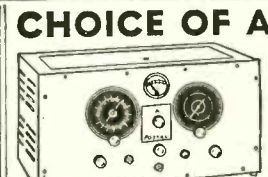

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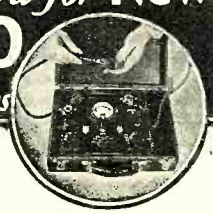

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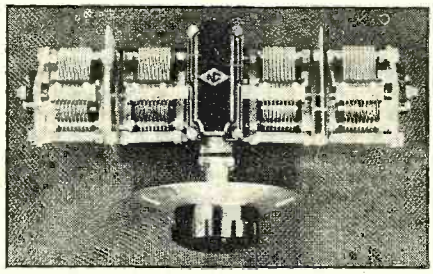
WHAT'S NEW IN RADIO

WILLIAM C. DORF

New Precision Ganged Condenser with Micrometer Dial

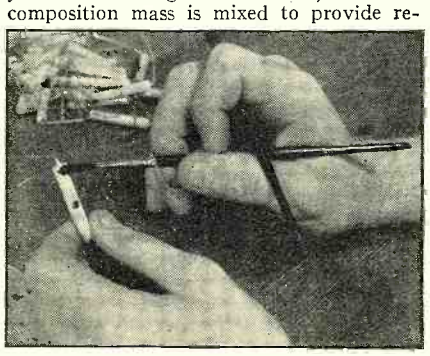
The National Company, Inc., introduces a precision ganged condenser and micrometer dial, new in design, and especially developed for use in short-wave receivers. The tuning drive is of the worm gear type providing a ratio of 20 to 1. The con-



denser sections are mounted directly on the gear housing and as a result, chassis distortion cannot affect condenser adjustment or calibration. The ⅜ inch diameter rotor shaft is supported in four bearings. The rotor plates are of the 180 degree straight-frequency-line type. Isolantite insulation is employed. The micrometer dial mounts directly on a support projecting from the gear housing. This unique dial has fifty divisions and makes ten revolutions in covering the tuning range, thus reading direct to one part in five hundred. Every tenth division, the dial is numbered, and the figures change automatically as the dial is rotated. The new condenser is available in two, three, and four sections. A single section unit is available for frequency meters and laboratory equipment.

New Resistors

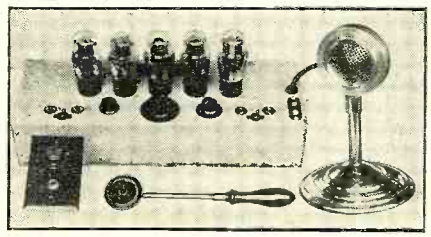
The Lynch Manufacturing Company, Inc., introduces a new type fixed resistor which, according to the manufacturer, represents the most important advance in resistor construction in more than ten years. In making these resistors, the entire composition mass is mixed to provide re-



sistor elements of a predetermined value, absolutely uniform throughout. This mix is extruded into rods under tremendous pressure. This method of construction results in a uniform, rock-like element with unusual current-carrying capacity, freedom from noise, long life and stable characteristics. The resistors are designed to eliminate any possibility of open circuiting and to be moisture repellent. A recent test of the resistors under various loads up to double the rated wattage showed a maximum resistance variation of less than 2%, the majority of the units remaining within fractions of 1%. The illustration shows a workman, color coding the new resistors. Duco paint is used, which means the color markings stay put and are always clearly distinguishable.

Group Hearing Aid Equipment

While the new Sound System, Inc., model PAC-7H group hearing-aid apparatus is designed primarily for the hard-of-hearing it can also be used as a portable public address system. There are provisions for the connection of a phonograph pickup, and loudspeakers can be connected to the output, where sound distribution is desired. For group hearing-aid equipment it should have wide application in churches, schools, theatres, it permits a number of hard-of-hearing persons to listen in at one time with volume and tone control at each outlet to meet the requirements of each



individual. The equipment makes use of a crystal type microphone and is capable of operating up to 50 headphone sets. The amplifier operates from 110-volt, 60-cycle a.c. line.

Multi-Range Meter

The new Triumph multi-range meter is compact, neat in appearance, easy to read

and easy to operate, employing only a single switching arrangement for all scales and ranges. The instrument measures both a.c. and d.c. volts up to 1000 volts, provides direct current readings of 0-50 and 0-500 milliamperes, and can measure resistances from ½ ohm to 1 megohm and by using an external battery will measure resistance up to 10 megohms. The low resistance values on the ohmmeter scale are spread for easy reading. It is an extremely handy instrument adaptable to numerous laboratory, experimental and servicing applications. When used in conjunction with a signal generator, as for instance the new Triumph model 100 all-wave instrument, it also serves as an output measuring device.

Universal Transmitting Inductance

This transmitting inductance made by

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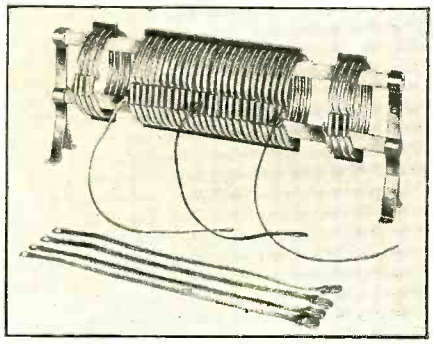
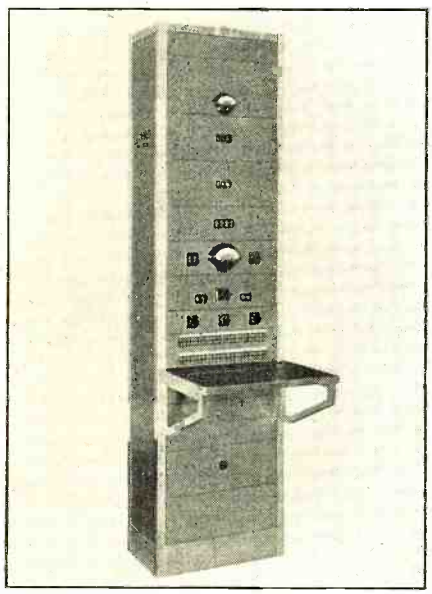
the Thordarson Electric Manufacturing Company is a complete single unit covering all the amateur and commercial transmitting bands from 20 to 160 meters. It is a helically-wound coil of copper tubing 4½ inches in diameter, divided into a number of four-turn coil units. Each coil is joined to the adjacent coil by a removable



clip, and each turn is joined to the succeeding turn by a similar clip, thus the units are variable in one turn steps. The inductance per turn is approximately one microhenry, greatly simplifying computation of circuit constants. Contact resistance of the clips is extremely low to prevent heating. All turns not in use are open-circuited by removing the clips, thus further reducing any possibility of losses.

Broadcast Station Equipment

This neat metal cabinet houses the new Western Electric No. 15A station speech input equipment. It is a self-contained unit and is made for use with a radio transmitter situated at a distance from the studio. The equipment consists principally of the No. 700a speech input bay,



which is an assembly of amplifiers, controls, meter panels, and other circuit accessories for one amplifier channel. All this apparatus is assembled on a series of panels mounted in this steel cabinet, completely wired and tested before leaving the factory. The equipment is designed to accommodate four incoming program circuits and two telephone order wire circuits. The manufacturer calls attention to the following features: complete a.c. operation, high quality amplifiers with uniform response from 30 to 10,000 cycles, wide flexibility and control, moving coil microphone for emergency announcing and improved appearance. The cabinet is finished in dark grey with satin-finished chromium plated trim and baseboard. Dark grey mats are used as front covers. Mounting screws and holes are completely eliminated from the face of the equipment by fastening the mats to the apparatus panels from the rear. At the rear of the cabinet is a steel door equipped with a safety switch which automatically shuts off the main power supply when the door is open.

Line Noise Filter

An interesting notice was recently received from the Technical Appliance Corporation on their new Taco H-F all-wave line filter. This new device comprises sep-

arate filter circuits for the broadcast and short-wave bands. It can be used on either a.c. or d.c. line supply and it can handle 250 watts. If preferred, the filter may be inserted between any electric appliance causing power line noises and the power line, thus combating interference at the source.

With the Experimenters

(*Continued from page* 465)

quencies just outside the "ham" channels. The most active of these special frequencies is 3497.5 kc., on which the station operates the Second Corps Area net. Other assigned frequencies are 3510, 7015, 7175, 14,030 and 14,350 kc. Highly-accurate crystals are used and the W2SC-WLN signals can therefore be used for checking frequency monitors or receiver calibration.

Electronic Alarm

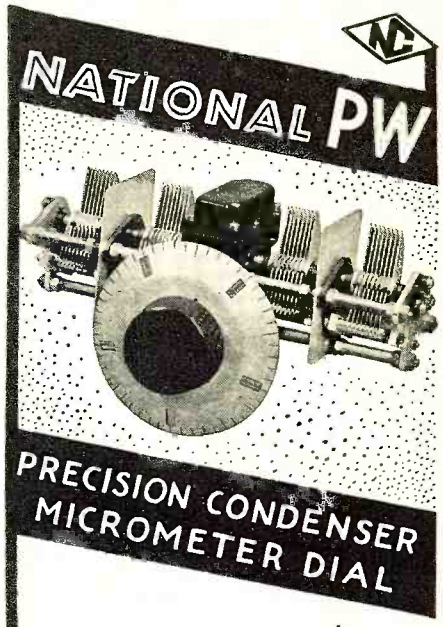
(*Continued from page* 466)

an extension arm outside of a window in a position such as to collect any rainfall.

A rise in temperature can be made to ring an alarm as follows: a mercury thermometer with its entire lower portion up to the 70-degree F. line is wrapped tightly with tinfoil and connected to the grounded post of the alarm device. Then, from 8 or 90 degrees to the maximum of the thermometer another section of tinfoil is wrapped tightly and connected to the high side of the alarm device. This upper electrode could be a split metal sleeve which would allow an adjustment as to the temperature at which the alarm device would work.

Finally, for counting the number of people passing by, a flat metal bar is fastened across the sidewalk and connected to the high side of the alarm device. The low side is then connected to a stake driven into the ground. The output of the alarm then operates a recording counter instead of an alarm device.

New uses will continually be found for this little device.



A remarkable new unit, electrically and mechanically far in advance of anything of its kind ever offered before. It overcomes the drawbacks of ordinary ganged condensers when used in Short Wave Receivers, combining electrical design of exceedingly low-loss characteristics, with a rigidity and accuracy of construction that is comparable to that found in a fine microscope or a toolmaker's lathe.

Has 20-1 ratio pre-loaded worm-gear drive in enclosed die-cast gear housing; ⅜" steel rotor shaft on 4 insulated bearings. Rigid 180° S.L.F. type Condenser sections with rotor sections separately insulated with Steatite-Isolantite, are mounted directly on gear housing; Micrometer Dial has 50 divisions and makes 10 revolutions in covering tuning range, reading directly to 1 part in 500. Numbers every 10 divisions on dial rotate with it but change automatically every revolution. Quality—not price, comes first in every detail of this outstanding unit.

List Price (subject to 40% discount when purchased through an Authorized NATIONAL DISTRIBUTOR), PW-1, Single Section, $13.50; PW-2, Two Section $17.00; PW-3, Three Section, $20.50; PW-4, Four Section $24.00.

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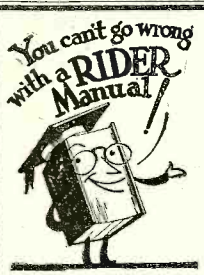

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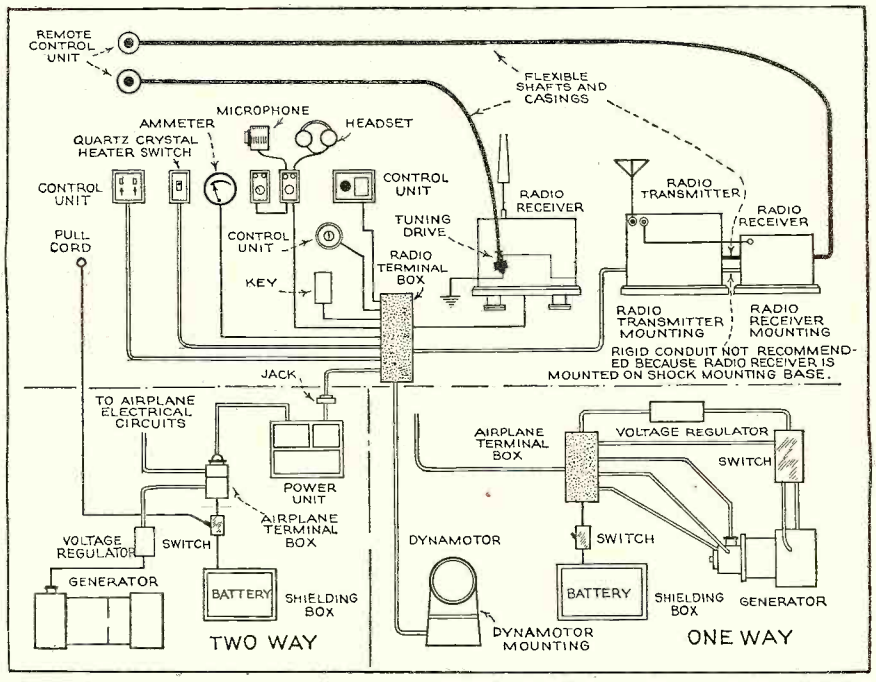

FIGURE 1

Aircraft Radio

(*Continued from page* 487)

Haphazard selection of equipment is apt to give haphazard results, and it is by far the best practice to use only the equipment *manufactured specifically for use with a certain set,* being guided in this respect by the set manufacturer's recommendations. A perfectly good unit of a different make may not be matched to the installation in all respects, and unless you are quite certain that it is, it is best to take no chances.

The same applies to all replacement parts. Use only the manufacturer's parts —*do not experiment!* There is neither time nor means to repair the radio in mid-air. Use the *best* materials and the *most thorough* workmanship, down to the *smallest* detail.

Once you know the layout of the equipment, you can proceed with the inspection. The procedure here described should be followed on every 20-hour check.

First switch on the receiver (using a test antenna, if necessary), and check for quality and volume of reception, sharpness of tuning, and freedom from parasitic oscillations. The most obvious defects found in this manner are noted, and their causes are looked for in the course of the subsequent inspection.

Irrespective of the quality of reception, check *all* tubes in a tube tester, and replace those which show signs of wear. Remember that after your work is finished the receiver will be expected to give service for 20 flying hours, which may be spread over two or three months.

If the quality of reception is good, proceed to go over all soldered connections. Those likely to develop crystallization should be touched with a hot iron to rearrange the molecular structure of the metal. Such joints will be found in the longer unsupported wires, and at angular joints, which are prone to vibrate.

Next, check the voltage and current for rated values with a set analyzer, and check the alignment of the radio-frequency and intermediate-frequency circuits, adjusting them for maximum output, as indicated on the output meter. It is advisable that a service oscillator be used in order to obtain a satisfactory input signal. The service oscillator should be equipped with an attenuator capable of affording complete control of the output signal, inasmuch as initial steps in alignment may require a very high signal output level; on the other hand, it may be necessary to reduce this output to an exceedingly low value when aligning certain high-gain receivers incorporating automatic volume control. The low output of the service oscillator, in the latter instance, *is* necessary to circumvent the normal automatic volume-control action.

Last, check the remote-control tuning apparatus for freedom of operation, lubricating the worm gear if necessary. Check the set mounting, see that the cushion mount is clean and securely attached to the ship; tighten all screws.

A Neat Workshop

(*Continued from page* 468)

two shorter ones next to it have been found ample for loose odds and ends. For holding small parts such as resistors, condensers, sockets, knobs, etc., there is nothing as good as ordinary cigar boxes, properly labeled. The parts stay clean and you know where to find them.

The bottom short shelf holds several six-compartment baking tins, in which nuts, bolts, screws, lugs, washers, etc., are kept. It is convenient to have these parts in open receptacles, as they are always in demand. The tins cost only a dime apiece.

This identical layout has been used in an attic, a bedroom and a cellar. A kitchen table three feet long will do if space is limited, but every effort should be made to keep the tools in the open.

As for the quality of the tools themselves, it is somewhat bromidic to say that the best tools are the cheapest. Some inexpensive parts, such as scrapers and small wrenches, are all right, but pliers, screwdrivers, drills, files and all other items should be selected with care. Beware of shiny tools offered at low prices; the bright finish usually hides cheap castings. Buy standard, advertised brands and you'll never be sorry.

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Backstage

(*Continued from page* 505)

appeared for the sponsor while Mr. Eddy is a newcomer to the tire company's ranks.

DICK LIEBERT, the young organist featured on several NBC periods from the Radio City Music Hall, New York, now comes to the air on a commercial feature presented Fridays over the same network by the Luden's Company. The feature is billed as Dick Liebert's Musical Revue and, in addition to the organist, presents the two-piano team of Robert Armbruster and Milton Kraus, a male quartet and Mary Courtland, contralto. Liebert is also featured in broadcasts with Jolly Coburn's Orchestra from the luxurious Rainbow Room restaurant recently opened atop the RCA Building in Radio City. Miss Courtland is presented on an additional series over CBS Saturdays.

CAPTAIN HENRY, the rôle created by Charles Winninger on NBC's Thursday night Show Boat Hour, was so established in the favor of listeners that his departure from the program called for unusual treatment on the part of the sponsor. It would have been pretty difficult for any other actor to step in the Captain Henry rôle, so the character was written out of the script by getting married to an old sweetheart when the time came for Winninger's adieu. Frank McIntyre, well-known stage actor who has done commendable bits of radio work in the past, fills the program bit vacated by Winninger. As George Henry—the Captain's brother, he will help pilot the Show Boat on its highly entertaining journey.

Verifying DX Reception

(*Continued from page* 476)

radio writers have been telling American listeners to send International Postal-Reply Coupons, which cost nine cents apiece and are good in countries belonging to the Postal Union, but even postoffices in large cities do not always have them in stock. Besides, some important countries, the Soviet Republics, for instance, are not members of the Union. It is a nuisance anyway to convert these coupons into stamps.

To simplify matters in this regard, the International DX'ers Alliance has inaugurated a unique Postage Stamp Exchange, through which listeners can obtain genuine stamps of all countries at cost plus a service charge of one cent, which is cheap enough. Thus in writing for verifications, the listener first purchases a stamp of the country from which the veri is requested, and encloses this with his report. At the other end, the station manager has only to stick this stamp on his own envelope, without going to the bother of converting postal coupons. This is a great idea and many DX'ers will undoubtedly avail themselves of the service.

The Stamp Exchange, which is directed by R. W. Schofield, (an official RADIO NEWS L.P.O. for Montana) carries stamps of 65 countries. Readers desiring information should address inquiries as follows: I.D.A. Stamp Exchange, 300 Evans Avenue, Missoula, Montana, U. S. A. This exchange was originally intended only for members of the International DX'ers Alliance, but it was recently extended to all DX listeners who want to take advantage of it.

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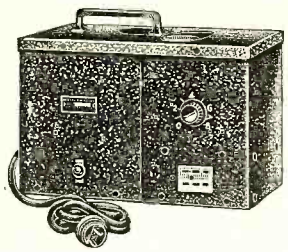

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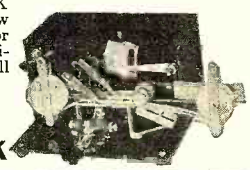

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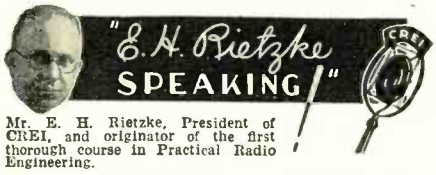

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The DX Corner (Short Waves)

(*Continued from page* 497)

G.M.T. On Wednesdays and Saturdays the program lasts until 16:30. On Sundays the station is on the air from 07:30 to 09:00. Frequency is 6000 kc., the power is .5 kw.

Belgian and Dutch Transmissions

An official communication from the Direction of Telegraphs and Telephones in Belgium was received by Mr. C. H. Armstrong an O.R.N.S.W.L.P.O. for Georgia. The letter states that ORK is on the air daily from 19:45 to 21:15 G.M.T. The wavelength is 29.04 meters and the power 9 kw. The same Listening Post Observer also has a verification from PHI. According to this letter, this station is on the air daily except Tuesdays and Wednesdays from 13:00 to 14:00 G.M.T. on a wavelength of 25.57 meters. They will return to the 16.88 meter wavelength in April. At present the programs are also being broadcast by PCJ on 19.71 meters.

I2RO Transmissions

An official communication from the Ente Italiano Audizioni Radiofoniche (E.I.A.R.) at Rome states that the Prato Smeraldo station is now transmitting on 49.3 meters. The American hour from Rome comes Mondays, Wednesdays, and Fridays from 6:30 to 8:00 p.m., E.S.T.

Bolivian Transmissions

An official communication from the Compania Radio Boliviana states that station CP5 will be on the air, regularly daily, from 7:45 to 9:15 p.m., E.S.T. The frequency is 6080 kc. and the power 1 kw. The identifying announcement is "CP4 and CP5 Radio Illimani, La Paz, Bolivia." The short-wave transmitter may be different for communication during the daytime. The call letters then are: CP6, on 9120 kc., and CP7 on 15300 kc. The daylight transmissions of these stations are irregular. The location of stations "Illimani" are at an altitude of 4089 meters, which makes them the highest broadcasting stations in the world, it is claimed.

W3XAU Transmissions

An official communication from WCAU Broadcasting Co. states that short-wave station W3XAU operates on 9590 kc. from 17.00 to 04.00 G.M.T., beginning with Monday, November 26, 1934.

W1XAL Transmissions

An official communication from the World-Wide Broadcasting Company states that short-wave station W1XAL will be on the air on Sundays, Tuesdays, and Thursdays from 6:30 to 9:30 E.S.T. on a frequency of 6040 kc. and using a power of 5 kw. This schedule is for December, 1934; it is hoped that during the following months the programs can be extended. W1XAL is thus starting an important experiment. The above named programs will be devoted to educational lectures and musical programs under the direction of an educational advisory committee consisting of such notable educators as: Alzada Comstock, Kirtley F. Mather, James A. Moyer, Harlow Shapley, James Thomson Shotwell, Levering Tyson, Walter S. Lemmon, William M. Barber. Some of the lecturers include: Dr. H. H. Powers, Prof. Robert E. Rogers, Miss Ella Munsterberg, Dr. J. Raymond Walsh, Robert Lamb, Prof. John Dewey, Prof. Henry Wadsworth Longfellow Dana, and others. The World-Wide Broadcasting Corp. is a non-commercial corporation which has built up and developed station W1XAL with this educational purpose in view. Reports of your reception and comments on the programs are invited. They should be addressed to the Educational Director, W1XAL, University Club, Boston, Mass.

VUB and VUC Transmissions

An official communication from the station director of the Indian State Broadcasting Service states that short-wave station VUB will be on the air Mondays, Wednesdays, and Saturdays from 16:30 to 17:30 G.M.T. The frequency is 9565 kc., the power 4.5 kw.

Station VUC transmits daily from 15:00 to 16:30 G.M.T. on 49.1 meters with a power of .5 kw.

Readers Who Helped Log Stations for This Month's Report

We are indebted to the following readers of RADIO NEWS who furnished important information on their reports of short-wave reception this month: H. A. Olson, J. W. Beckman, M. Mickelson, C. L. Davies, L. C. Styles, R. Stevens, R. Lawton, A. G. Laws, R. S. Houghton, W. P. Kempter, E. L. Kimmons, H. W. Eck, L. M. Jensen, Rudolph Kure, J. V. Vann, G. W. Twomey, P. H. Robinson, J. N. Noff, Wm. Schumacher, Clifford Pryor, R. E. Smeska, Felipe Saldana, G. R. Bigbee, Glenn Deater, C. H. Armstrong, Mike Kruger, Floyd Waters, Edmore Melanson, D. S. Catchim, G. R. Johnson, Jack Bews, E. R. Wickham, G. H. Fletcher, H. P. Brown, G. C. Sholin, B. F. Goodlett, D. W. Shields, P. J. Seyffer, Louis Hahn, W. W. Loudon, Mrs. L. R. Ledbetter, A. E. Emerson, Drexel Peterson, W. J. Prokosch, J. M. Malast, Henry Spearing, Laird Brandenburg, A. F. Knobel, C. B. Will, H. A. Otto, L. H. Andrews, R. S. Reynolds, E. J. Shields, E. M. Horton, S. Terry, Charles Miller, L. A. Wood, George Krebs, J. C. Kalmbach, Jr., Donald Smith, N. J. Coriell, J. G. Moore, C. D. Hall, H. W. Newell, H. Adams, Jr., H. R. Peck, Harry Woods, Jr., G. M. Charton, C. A. Morrison, W. W. Beal, Jr., F. H. Kydd, Andrew Covington, Robert Edkins, J. O. Clarke, W. A. Oker, M. D. Haines, J. M. Coleman, Dr. F. C. Naegeli, H. Kemp, Herbert Braker, Arthur Hamilton, R. C. Huff, R. R. Gurney, Mr. and Mrs. G. W. Hough, Russell Bills, William Oberlin, F. E. Day, S. J. Emerson, J. T. Spalding, the Editor of *Tune-In*, C. McCormick, Herbert Kranitz, H. R. Drake, L. M. Jensen, F. J. Sadilak, F. T. Beard.

The Editors acknowledge with thanks the assistance of public-spirited readers who have thus co-operated to make these columns so successful and helpful. Let us urge our readers, one and all, to continue, in even a larger way, to send in these reports. We would be grateful if every reader who hears even a single station would send it in to us with just the data as to its wavelength, the time which it was heard, etc. Of course, we would prefer to get more information, including the Best Bets in each listener's locality, as well as definite logs of stations, their wavelengths, and times of transmission. Readers will also help by stating what type of receiver they use in logging these stations.

No Comparisons Made!

For the past four years, under the present editorial regime, it has been the policy of RADIO NEWS and its editors *never to make any comparison* between articles of radio equipment of competitive manufacture, either by word-of-mouth, by letter or

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in articles appearing in the magazine. The editors have never felt that such a comparison, however well-meaning it might be, could be fair in all circumstances to *all* parties concerned. Therefore, as far as RADIO NEWS is concerned, it simply isn't done!

Occasionally we receive, from prospective buyers of radio equipment, letters asking for our "opinion," to be held "strictly confidential." Even in these cases our editors have politely refused and must continue to refuse to give such controversial information, as it would have to be based upon individual judgment. Also, on infrequent occasions, we are notified that some manufacturer alleges that RADIO NEWS or its editors have stated that his apparatus is better than that of other manufacturers. Our editors have *not* so stated, and such claims are *unjustified* and without sustaining evidence.

So, if our readers really desire such a comparison, they must make it themselves! If they will write to us, we *will* see to it that descriptive literature and information on the products in question are sent by the manufacturers to readers requesting it. But please do not write to RADIO NEWS asking for comparisons.

Slide-Wire Bridge

(*Continued from page* 489)

resistance range of .01 to 1,000,000 ohms. For capacity a second scale is necessary, calibrated for .01 to 100 times the standard value, giving a range of .001 to 100 mfd. for the three standards of 1, .1 and .01 mfd. While it is possible to secure this extreme range of capacity at 1000 cycles, due to the high ratio used, the accuracy outside of a 10-to-1 range is not satisfactory. The greatest accuracy is secured in the range of .3 to 3 times the standard. In this range an accuracy of 3% may be secured.

The construction and assembly are simple. The most important point is to have connections of low resistance. In order to secure this, number 12 tinned copper wire was used. No directions are given regarding layout, as it is assumed that this will fit in with the constructor's own ideas, or that he will purchase one of the kits being offered, which include a drilled and calibrated panel. The first parts to be assembled on the panel are the binding post and their insulated washers. Be sure to tighten the holding nut to prevent turning. The push-button switch is now placed on the panel. This is set with a slight angle toward the potentiometer in order to clear the bank of condensers. In mounting the push-button switch it is necessary to use a bushing to clear the panel. The next unit to be mounted is the range selector switch. Set the stop control on this so that it stops the blade in the ninth position. This switch is mounted also with a bushing on the shaft and is fastened so that the fifth contact from the start is on top. The two-terminal strip is now mounted on the pillar opposite the switch blade connection. The last unit mounted is the potentiometer; in fact, this should not be mounted till all the rest of the unit is wired. This is to prevent breaking or scratching the winding. The calibration of the bridge depends upon this unit. Do not use lugs for making the wire connections; bend the bus-bar around the screws and tighten the holding nuts, then solder.

Place the small knob on the range selector switch and adjust it so it indicates the proper position, then tighten securely to shaft. Adjust the large knob on the potentiometer and set it so that the pointer lines up with the two end stops, but do not fasten securely to shaft.

Connect the bridge as per Figure 3, but short the terminals marked "unknown." Set the range selector on .1 and the ratio point about .1. Then press the button lightly and observe the galvanometer. If necessary, adjust the ratio arm till a balance is secured. Do not hold the battery button down longer than necessary, as large amounts of current are drawn from the battery. With practice it will be possible to slightly touch this button and note deflection on galvanometer. A balance should be secured between .2 and short. This indicates a resistance of .02 to .008 of an ohm. Now set range selector on Ext. and ratio arm about 3 and adjust for balance. If a balance is secured below 4, the wiring of the bridge is satisfactory. Now connect a rheostat as the unknown and set range selector on 1 and ratio dial on 10. Adjust rheostat until a balance is secured, then change range switch to .1. A balance should then be secured at 100. If a balance is secured at some other point, correct the knob to indicate properly; then check at 10, and repeat. If it indicates properly, set range switch at 10 and secure a balance at .1. By readjusting the potentiometer on some other range, the standards may be checked against each other. If the setting agrees satisfactorily, the knob may be fastened securely and, as per Figure 2, the capacity range checked on a.c.

The bridge may be calibrated in the following manner. Secure General Radio 1- and 10-ohm standard decade boxes. Set the range switch on 1, the unit decade on 1, the 10 decade on 0, and have the two decade boxes connected in series at all times. Secure a balance for 1 ohm and mark the panel or paper, being careful to locate the point exactly. Repeat this till the 10-ohm position is secured. Now set unit decade dial at 0 and secure points for each of the 10-ohm decade steps. Then set the range selector switch at 10 and check the unit point by means of the 10-ohm box. Then set the range selector switch at .1 and check the points secured from the 10-ohm decade boxes by means of the unit decade. If there is a large error in these points, set the range selector switch at the external position, and connect one of the decade boxes as an external standard, the other as the unknown value. Adjust them to equal values and then secure a balance by means of the ratio arm. Then connect both decades as unknown and measure the value of the standards. With only two boxes it will be possible to check the 100 ohms standard to 1%. Do not change the position of the ratio arm while checking standards.

If the different ranges check after taking the first twenty points, it is now possible to calibrate the rest of the bridge. Set the 10-ohm decade at 10 ohms, range selector switch at 1, and secure the 10 points required from 10 to 20. Then setting the 10-ohm decade at 20, secure the next 10 points between 20 and 30. Between 30 and 40 it is only necessary to secure 4 additional points; 40 to 50 is also calibrated in 2-ohm steps. From 50 to 100 it is only necessary to check each 5 ohms. Now set the range selector switch at 10 and with the unit box secure the .1 scale calibration points; that is, the first 10 points required, then setting the 10-ohm decade box for 10, 20, etc., secure the additional calibration points required from 2 to 10. It is only necessary to secure a point for every 2 ohms. A total of 110 calibration points are required for the resistance scale.

The equivalent calibration is secured for capacity, using a.c. for the generator, and a decade capacity box for the unknown. The capacity scale is in opposite direction

(*Continued on next page*)

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Ohmmeter Design

(*Continued from page* 480)

flatiron to the point where the moistened finger will just sizzle and turn it off. Hold the scale; place the flatiron on the exposed half and hold it in place until the heat is felt in the other half, then remove iron. Hold the scale in place until it cools a little. Repeat with the other half. The .1 ohm center-scale range, and the 100 ohm center-scale range, using Figure 1(C), will be read directly on the lower and upper scales respectively. Other ranges using Figure 1(D) will be read on the lower scale and other ranges using Figure 1(C) will be read on the upper scale by merely moving the decimal point, one, two, three or four places to the right. Of course a metal scale would look better and be less subject to errors. If thirty-five or more experimenters manifest a desire to purchase accurate metal ohmmeter scales, the author will have some made. Please mention the meter model in your communication. Because Jewell half-scale current is at exactly half scale, and Weston half-scale current is 1.7 percent above half scale, the upper scale will read 4 percent and the lower scale will read 4 percent low when used on Jewell meters.

RANGE	METER USED	POSSIBLE ERROR
10 OHM	0-1 MA	.87 OF 1%
10 "	0-1.5 OR 2 MA	2.34%
OTHER RANGES USING ANY METER		.23 OF 1% OR LESS

NOTE - THEREFORE, USE AN 0-1 MILLIAMMETER, IF AVAILABLE, ON THE 10 OHM RANGE

FIG. 5

The values in Figure 2 will cover most conditions, but should the internal resistance of the meter be 10 to 20 percent below the rated value, a condition could be obtained when using Figure 1(C), where it would be impossible to adjust to full scale. Should this occur, bring the meter resistance nearer normal, by putting a fixed resistor in series. The resistor could even be a portion of an old rheostat with the wires soldered or bolted in place (do not use the arm), as it need only be approximately 5 ohms for 1, etc.

Slide-Wire Bridge

(*Continued from page* 519)

to the resistance. The accuracy of the bridge depends upon the accuracy of the standards used and the care taken to secure the necessary points. After the calibration is secured, the panel should be inked in and covered with celluloid to prevent wear and soiling.

For the convenience of our readers who wish to avoid the job of calibration, a kit has been made available for this bridge, by Wholesale Radio Service Company. A complete list of parts follows:

Parts List

Parts of equivalent quality and accuracy may be substituted.
1—General Radio, type 214A potentiometer, 400 ohms
1—Lafayette aluminum panel, etched and calibrated, 4½ inches by 9 inches
1—Lafayette steel case
5—Trutest special 1% wire wound resistors: 1, 10, 100, 1000 and 10,000 ohms
3—Trutest special bridge condensers: 1, .1 and .01 mfd.
1—Yaxley, type 1211 selector switch, 1 circuit, 11 point
1—Yaxley push button switch
1—Analyzer pointer knob, large type
1—Analyzer pointer knob, small type
8—Insulated binding posts
8—Sets of insulated bushings for binding posts
2—3/16 inch bushings for switches
5 feet number 12 tinned copper bus bar

Hi-Fidelity Tests

(*Continued from page* 469)

Users of high-fidelity sets will have an opportunity to test maximum program quality when stations are created on the high-fidelity broadcasting channels between 1500 and 1600 kilocycles, spaced 20 kilocycles apart.

Engineers compare the value of high-fidelity with high speed in an automobile. They point out that, at times, traffic conditions, bad roads and inclement weather prevent the use of top speed. But there are many occasions when the high-speed can be utilized and the feature tends to improve performance at lower speeds. So, although high-fidelity cannot always be used in the receiver, the feature proves highly advantageous when it can, and the wide reproduction band tends to improve reception at 5000 cycles.

A gala and novel début was arranged for the high-fidelity receiver. The initial demonstration was given at the Waldorf-Astoria Hotel, New York, before an élite gathering of society and musical folk. The entire nation was able to listen-in on the event via a CBS hook-up. Miss Lucrezia Bori, the opera star, appeared on the stage and sang three songs directly into the network microphone. Then she stepped into a glass-walled booth on the same platform and sang into the microphone of a tiny transmitter located in the ballroom. This time her voice was sent over a radio-frequency wire to one of the high-fidelity sets in the room, and a network microphone picked up the sounds emanating from the loudspeaker. Thus, listeners had an opportunity of noting any actual differences in reception quality.

I. F. Coupling

(*Continued from page* 479)

to show the variation in amplification as the coupling is varied. Under actual measurement, however, the gain per stage, using a type 58, or equivalent tube is approximately 100 at minimum coupling, and 180 at maximum coupling. For all practical purposes, however, spacing greater than 1 inch between primary and secondary will not be required and with this degree of coupling the gain per stage is well over 100.

Reference to Figure 2 will show that as coupling is increased the curve takes on a distinct double hump appearance. In a single transformer the depth of the valley between humps would not be extremely important, but when the effect of four such transformers is combined, this double hump does become serious—or at least it would be serious if a remedy were not available. This remedy is a simple one and quite obvious. Instead of ganging the coupling control bars of all transformers in an i.f. amplifier, one or two of them can be left at a fixed adjustment. Then when the gang controls are adjusted to provide a characteristic such as shown in curve F, for instance, and the other transformers are left at a fixed adjustment corresponding to curves A or B, the peak of the non-variable stages will tend to fill in the hollow in the close-coupled variable stages, resulting in an excellent approximation of a flat-top curve varying from 18 to 16 kc., in width at the top, depending on the degree of coupling employed in the fixed transformers and the setting of the coupling control knob of the ganged transformers.

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Mechanically this new transformer is assembled in a heavy-guage shield "can" 2 inches square and 5 inches high. The tuning condensers are so mounted as to be adjustable from above the chassis when the transformers are assembled into a receiver. Moreover, both of these adjustments are on the same side of the can, thus allowing a good deal of flexibility in laying out a chassis. Electrically the transformers are equally good. Naturally with a variable coupling member, provision had to be made to avoid changing characteristics due to the leads of the movable coil "clopping" around when the coil is moved. This has been guarded against by using two phosphor-bronze spring ribbons, the relationship between which remains identical regardless of the position of the movable coil. Both coils are assembled on bakelite plates and a third bakelite plate serves as the anchorage for the two phosphor-bronze strips. Two of these plates are firmly anchored in position while that bearing the movable coil is rigidly but movably supported on two middle rods, over one of which a coil spring is slipped to maintain the position at which the movable coil is set.

These transformers are available with a collar which may be slipped over the adjustment rod to fix the coupling at any desired position for use where variable coupling is to be limited to some value less than the minimum or where permanent adjustment is to be employed.

Thus the experimenter has available a transformer which can be used as a variable-coupling unit or a fixed-coupling unit, or in combination. He can design his receiver for a permanent degree of high fidelity, permanent high selectivity, or with both of these features variable.

Aid to Inventors

(*Continued from page* 486)

invention without authority. A patent may be invalid for many reasons, mostly technical; such as that which it covers not really being an invention in the meaning of the law. A later legal claim of anticipation is really the same thing as an anticipation or interference discovered by the Patent Office while examining the case, except that it was not so discovered but is alleged later by the patent's attacker.

Such patent suits are legal matters beyond the scope of these articles, but it should be noted here that the exact details of how, when and by whom an invention was conceived, reduced to practice and gradually perfected may be of extreme importance as evidence in any such litigation.

The second way of giving away an invention is by presenting it to the public. Nothing in the law compels an inventor to protect his invention. Anyone may give his inventions to the public, either by a special legal declaration to that effect, by mere default or accidentally. Many scientific men habitually do this, especially in the medical profession. The important thing is to be sure that you give away inventions only when you wish to, not when you do not wish to or do not even know that it has happened.

The rule of law is that everything depends on the inventor's intention, but, as usual, this intention must be determined by evidence. There is one definite legal limitation. If an article is sold or an invention used commercially, the inventor must apply for patent within two years. Otherwise the law assumes that he intends to present his invention to everybody. Similarly, if two years passes after publication of some account of an invention, no patent can be applied for thereafter. Even during this two-year period within which sales or publication may be permissible, these acts may be dangerous, not because they in themselves invalidate a later application for patent but because they may be taken as evidence that the inventor wishes no patent protection but intends to present his invention to the world.

In such matters, as I previously have remarked, an inventor is not his own best adviser. A skilled patent lawyer is desirable, just as he is when a patent is being applied for. This brings us to what is probably the most important single problem for inventors. What kind of a patent lawyer shall be hired and how is this lawyer to be found?

There is no royal rule for hiring lawyers, any more than for being sure to get a good doctor or consulting engineer or any other adviser in the perplexities of existence. The best way, if practicable, is to hire a patent attorney whom you personally know to be competent and honest.

As is true of doctors, consulting engineers and most other professions, dishonesty is little to be feared among legally registered attorneys. Incompetence is very much so. Even the fact that a patent attorney happens to be your friend or is known by you to be an honest and upright person, does not prove that he is as competent as you need him to be.

If there is no attorney whom you know for certain to be competent, the best procedure is, I believe, to inquire from other attorneys whom you do know; from your own general attorney if you have one. General attorneys have occasion from time to time to retain various kinds of legal specialists. Most of them know such specialists whom they can trust, including patent attorneys. If you can get several other attorneys to recommend or speak well of the same patent attorney, that is reasonably good proof that he is a good one.

The situation is the same as that of a sick man seeking a specialist. If several family doctors recommend the same specialist, he probably is a good one.

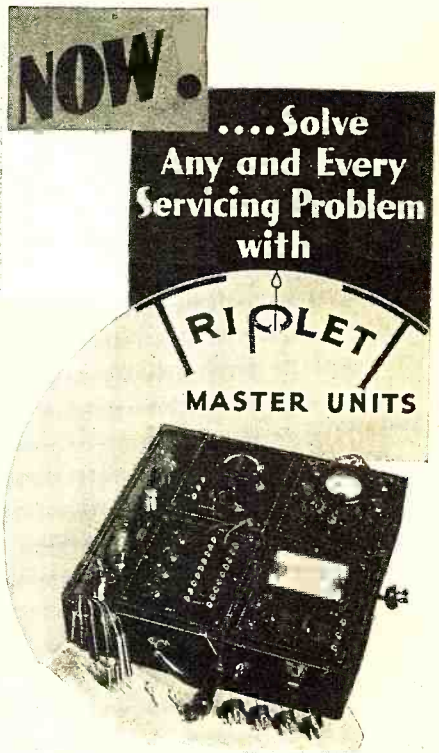
A patent attorney's clients may be a useful guide. If he is retained regularly by other successful inventors or large manufacturers whom you know of, he probably is competent and reliable. His fees probably will be intermediate between the highest and the cheapest.

Radio Experimenting

(*Continued from page* 463)

developing new receivers. You may be interested in a special field like Television or the Short Waves, or again you may be simply interested in Tinkering with Circuit Designs, Transmitters and Receivers for your own use or for Home Laboratory Experiments in amusing your friends. No matter what your interest, we believe you will find it awakened and refreshed in this current issue of RADIO NEWS.

The Editors have included, this month, experimental material for many types, in the following articles. Read them and find out what other experimenters are doing in the home and in the professional laboratory. We think you will be enthused and encouraged to follow up those experimental "urges" one has, every once in a while. Don't let them get away from you, but follow them out to a successful conclusion. You may discover something that no one else, before, has thought of.



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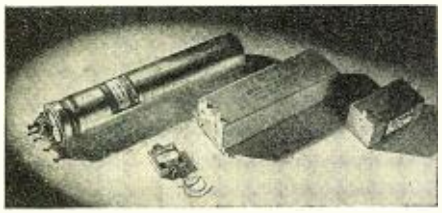

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The Technical Review

(*Continued from page* 511)

book also contains detailed information on the complete home-study courses in radio and allied subjects offered by the National Radio Institute.

25. *Noise-Reducing Antenna Systems.* Two types of noise-reducing systems perfected by the Lynch Mfg. Co. for both broadcast and short-wave reception.

26. *Auto Radio Antennas, Filters and Noise Suppressors.* The line of Lynch antennas, filters and ignition noise suppressors especially designed for motor radio installations. Data on how to eliminate motor radio noise is included.

34. *Serviceman's 1935 Replacement Volume-Control Guide.* Revised list, in alphabetical order, of all old and new receivers showing model number, value of control in ohms and a recommended Electrad control for replacement purposes.

57. *How to Build a High-Quality Condenser or Ribbon Microphone.* The Amperite Microphone Kit, with which it is possible to build, easily and quickly, a high-quality condenser or ribbon microphone.

60. *Transformers and Choke Coils for Use in Public-Address Amplifiers and Radio Receivers.* Information on the characteristics of a wide variety of Amer-Tran De Luxe and standard audio and power transformers and chokes.

63. *Moderate Priced Transformers and Chokes.* Descriptions and prices on the new Amer-Tran line of moderate priced audio and power transformers and chokes designed for original and replacement use in radio receivers, amplifiers, public-address systems and amateur transmitters.

65. *New 1935 Line of Testing Instruments.* Information on the new 1935 line of Supreme testing instruments including the new 5" fan-shape meter, the new Model 333 deluxe analyzer, the low-priced Model 333 standard analyzer and an improved Model 85 tube tester.

66. *An A.C.-D.C. Tester Which Can Be Built at Home at Low Cost.* Information about the Supreme 5" fan-shape meter, rectifier and resistor kit for the home construction of an inexpensive A.C.-D.C. tester.

67. *Practical Mechanics of Radio Service.* Information, including cost, features and outline of lessons of the Frank L. Sprayberry course in radio servicing and list of Sprayberry data sheets for modernizing obsolete test equipment and receivers.

68. *How to Modernize the Supreme 400-B.* Data Sheet No. 4 of the Frank L. Sprayberry series of data sheets on how to modernize obsolete test equipment and receivers.

69. *Case Records of Broadcast Receiver Repairs.* Gives plan, contents and price of the Capitol Radio Research Laboratories' loose-leaf case records of 1500 service jobs showing how actual troubles were corrected. Serves as a guide in correcting troubles in all types of receivers and power supply units.

70. *Data Sheet on Building an Analyzer Adapter.* Compiled by the Capitol Radio Research Laboratories to show servicemen how any analyzer may be brought up to date or how to build a complete, modern analyzer out of spare parts with a multimeter.

71. *Radio Parts and Sets for 1935.* A catalog issued by Try-Mo Radio Co., Inc., listing the wide variety of sets, chassis, standard, special and replacement parts, tubes, tools, books, public-address systems, amplifiers and other electrical equipment required by radio dealers, servicemen, experimenters, set builders, radio operators and engineers.

Dots and Dashes

(*Continued from page* 461)

the Akron, Ohio, airport in his company's Lockheed Vega plane, bound for this city, he tuned his radio receiver to the Department of Commerce station WWO to obtain the regular one o'clock weather broadcast. Instead of the weather broadcast he was startled to hear the following: "Calling Ray Brown in Lockheed NC 539M. Your landing gear is gone! You have lost your right wheel." Leaning out of his compartment he glanced down to find one of the shock struts and the right wheel dangling in mid-air. He knew that meant landing on one wheel, if at all! If he had not heard the radio call, he would have made the regular 3-point landing which would have resulted in an inevitable crack-up. He turned around and headed for the home airport and, sure enough, the boys were standing by with an ambulance, fire extinguishers, and emergency equipment. He landed by setting down, first his tail wheel and then his left good wheel, side slipping the plane into a perfect landing as the watchers gasped. "Treat's on me," he said, "thanks to the radio. It's an old Spanish aviation custom."

Signal Generator

(*Continued from page* 483)

C15. In any a.c.-d.c. signal generator we must set up a point of minimum r.f. potential, since the case cannot be directly grounded to the B— without danger. By using the system described above, the lowest attainable r.f. potential, with the amount of filtering used, is secured at point *b*. When this point is joined to the ground post of the receiver under test, an extraordinary degree of attenuation is secured.

For the extreme high frequency bands, complete attenuation was found difficult. Attempts to vary the cathode bias to decrease the r.f. voltage generated resulted in a frequency shift which could not be tolerated. The solution was found by switching the screen-grid to ground. This causes a considerable decrease in r.f. output and results in complete attenuation over the standard broadcast band, with negligible frequency shift, and very satisfactory, but not complete, attenuation at the highest frequencies, without additional filtering.

Attention is also called to the fact that the output circuit of this attenuator provides a reasonably constant load across the receiver input terminals. If the moving arm of the attenuator were connected to the high, or antenna, output terminal the load on the receiver input circuit would change over a very wide range at different settings of the attenuator. A receiver, therefore, with a very low impedance input circuit, but relatively insensitive, might conceivably test as more sensitive than a much better set. The writer does not wish to give the impression that this signal generator is suitable for laboratory measurements of sensitivity. Such tests require a non-inductive, hand-constructed design if a resistance type attenuator is used, and are unnecessary for service work and im-

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practical for the serviceman to attempt without special equipment.

The band-switching arrangement is shown in figure 5. An ordinary 2-deck, 6-point Yaxley switch may be used. Switch *a* represents the deck farthest removed from the panel. The oscillator coils are all wound on half-inch wooden dowels and are carefully designed to eliminate the usual "double hump" characteristic common to many signal generators designed for radio service work. The tuning condenser employed is one of National's 270 degree line. This has the advantage of spreading and making more accurate calibration and reading possible.

The line filter coils may be constructed without difficulty, being also wound on half-inch dowels. They are designed to be effective over the highest frequency band, since they are not required for the other bands.

Instructions for building the instrument and a complete list of the parts employed will follow in the March issue.

P. A. Amplifier

(*Continued from page* 488)

So, four sources of signal can be connected to the amplifier, any one of which can be chosen by means of the two switches, and any two sources can be mixed. This circuit is shown in Figure 2. The output transformer accommodates a 500-ohm line or a voice coil (15, 8 and 4 ohms). The total power consumption is 100 watts for

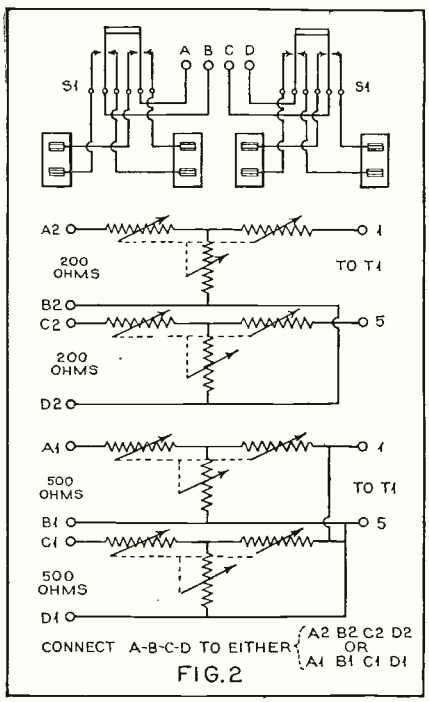

FIG. 2

the 18-watt amplifier and 150 watts for the 36-watt amplifier.

The amplifier is extremely flexible, both electrically and mechanically. It can be mounted on a rack or used as table mounting with but few changes. Furthermore, when it is mounted on the rack, the panel can be removed without removing the chassis. All the wiring is thus exposed by taking off the panel. The chassis comes prepared for mounting either the push-pull parallel or the single push-pull stage. All the parts and accessories, a radio tuner and a phonograph will be made available to our readers by the Kenyon Transformer Company. In the next installment, details of a pre-amplifier having a gain of 50 db. will be given.

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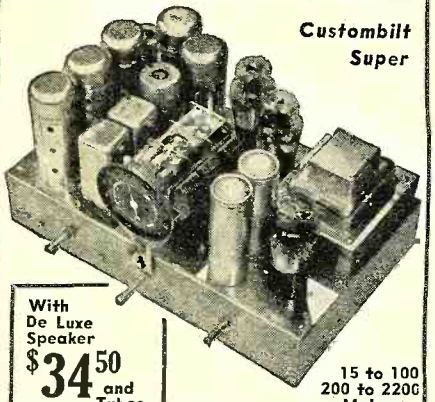

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S. W. Converters

(*Continued from page* 502)

cannot afford to discard, the RADIO NEWS Laboratory has been making a study of the possibilities offered by converters and has started work on such a design with the idea of presenting a constructional article on it next month. The first model of this converter is shown herewith and is now under operating tests and measurement in the Lab and at the RADIO NEWS Listening Posts. The experience with this model has been valuable in pointing to improvements which will be incorporated in the final model.

As the converter stands at this writing, it employs four tubes: a 6D6 in a tuned r.f. stage, a 6D6 as the mixer or modulator, a type 36 as oscillator and a type 80 tube as rectifier in the built-in voltage-supply system. The circuit is shown in Figure 1. This unit is designed to cover the important short-wave broadcast bands lying between 18 and 50 meters, with a single set of coils. It is felt that this single range includes the short-wave transmissions in which the average listener is interested, and, at the same time, the expense and complications of a coil-switching system is eliminated.

The output of the oscillator is fed into the control grid of the 6C6 mixer tube. It will be noted that the plate of the 36 tube is not a part of the oscillatory circuit. Instead, the screen of this tube is employed as the oscillator plate, while the plate proper is used as an electronic coupling element.

A tuned-output transformer is included in the plate circuit of the mixer tube. This serves the purpose of definitely tuning the output of the converter to the frequency at which the broadcast receiver is set. This is accomplished by means of a trimmer condenser mounted in the can with the output transformer.

While the circuit may appear to be somewhat complicated for what has been too often looked upon as a simple accessory unit, it nevertheless represents the type of converter unit required if real effectiveness is to be obtained.

It is believed that full constructional details of the final model of this converter will be ready for the next issue. Complete constructional blueprints will be available. Readers who are interested in obtaining these blueprints at the earliest possible moment can place their orders in advance by sending 50 cents to the RADIO NEWS Blueprint Department. These blueprints will be of a new, more costly type which completely avoids any distortion in dimensions. As a result, the prints may be used as drilling templates with assurance of accurate location of all holes, cuts, etc.

Variable Resistors

(*Continued from page* 484)

resistance-coupled amplifier combination.

The structural details of a volume control are of the utmost importance in assuring long life and constancy of performance. Variations of humidity and temperature should have no effect on the resistive elements. In practically all the higher values of resistance elements, carbon in some form is used. Humidity has but negligible effect on carbon, but if the carbon is applied to paper or to some shrinkable or flexible base, the arrangement of the element particles will be disturbed every time flexure or shrinkage occurs, with subsequent development of "noisy" operation. If the base to which the resistive element is applied is absorbent, in humid atmospheres the surface resistivity is apt to decrease to a deleterious value, resulting in a roughened contact surface, noise and decreased overall resistance.

A desirable mechanical feature is to make the slider meet the element in a straight line without covering a wide portion of the resistance. In the latter condition, in steep tapered sections, an appreciable portion of the resistance will be short-circuited, resulting in a detrimental decrease in overall resistance. The resistive element should be arranged so that all current paths are equal thus preventing any uneven heat dissipation. Capacity effects in the control should be minimized by having the terminals spaced properly and by not having metal sections close to the terminals, contacts and the element itself. To insure positive operation the pressure on the resistive element must necessarily be uniform throughout the excursion of the contact arm.

Very frequently volume controls are rendered useless by the twisting that the contact arm is subjected to by the stopping arrangement. The stop arrangement should desirably be a separate arm other than the contact arm. One must also be certain that the center lug and the collector ring contact is positive and preferably of an unfreezable metal combination.

Sometimes chattering of the contact arm is encountered with resulting jumping and therefore sudden increases and decreases in resistance. Also it must be noted that if a wiping contact is used the possibility of dust forming an insulating layer between contact arm and resistance element is eliminated and quiet operation assured.

It is obviously evident that there are numerous factors to be taken into account before a volume control or variable resistance is chosen, all of which are of the utmost importance, and each of which can of itself determine the performance of your receiver.

Foreign DX

(*Continued from page* 477)

Rome a battle, so we skip down to 1140 kc. and find Turin with the same program. Our third Italian is Milan on 814 kc. I listen to these until 2 a.m. Copenhagen is next logged on 1176 kc. with 15 minutes of church hymns. At 2:10 a.m., just able to hit 959 in time to hear Poste Parisien come on with his bugle. Poste Parisien is the best of the lot. After five minutes we go to 1456 kc. and hear Radio Normandie with two march selections, to be followed by French news items. Going back up to 575 kc., I find Stuttgart with excellent volume, now that WMCA is off the air. But what's that on 565? It's TGW in Guatemala City, Guatemala, giving a special Monday morning DX program of marimba selections. I listen to these four and at 3 a.m. continue my hunting. It is now broad daylight in Europe, so must hurry; all stations are starting to fade now. One good catch is left, so tuning to 592 at 3:05 I find Vienna starting its transmission. Then in rapid order Hilversum on 995 kc. is heard with recordings, Toulouse on 913 kc. is heard for the first time this morning, but fading badly. I check again at 3:30 and find only Hamburg on 904 and Leipzig on 785 kc. left. The rest have all faded away.

The above is the results obtained from three hours' tuning. Checking up, I find I've logged 18 stations, hearing them all with sufficient volume to identify and re-

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Excellent fidelity characteristics—Free from background noise—directional—not affected by temperature changes or humidity—completely assembled with matching transformers with 200 or 500 ohm impedance—frequency response from 60 to 10,000 C.P.S.

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PLUGS in any lamp socket. Charges any auto-type battery overnight. Creates no radio interference. Uses no expensive bulbs, "dry units" or messy liquids. Has only ONE moving part, replaceable for $1.00, after thousands of hours' use. The FASTEST, most EFFICIENT and LONGEST-LIVED home charger made. Ideal for Battery Station, Garage, Trucks, etc. Money-back guarantee. Nearly one million sold since 1920 at $19.50 list. Now only $16.95 *postpaid* (or at your dealer), complete with ammeter, 10-foot cables, dash plug, etc. Write for introductory proposition and FREE booklet.

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Please send me your big Free Book on Television, Talking Pictures, Radio and Electricity. Also details of R. R. fare offer.

Name.....

Address.....

City.....State.....

quest verifications. But this was not all that was logged that morning. I have only mentioned the stations that were heard on the speaker. Several weaker stations were heard on earphones, all good enough for a veri. These were Bratislava, Czechoslovakia, on 1004 kc. at 1:05 a.m., giving orchestra music. Horby, Sweden, on 1131 kc. at 1:55 a.m. This was the weakest of all stations heard. And the last European was Frankfurt on 1195 kc. at 1:30 a.m., with an orchestra. This makes a total of 21 stations heard in three hours, in 10 foreign countries. What more can a DX'er ask for? Add to this the two British, three in the Argentine and one in Venezuela received the night before and you have the results of the six hours' tuning mentioned at the start. In the next article the story of reception around sunrise will be told, completing this night's log.

The Service Bench

(*Continued from page* 507)

hitting the set—a time honored procedure—is due to a loose filament in the 46-A or 46-B ballast tube."

Peculiar Cause of Noise

"I recently ran across an unusual case of noise. The set developed a nasty crackle whenever it had been on for any length of time. The resistors and condensers tested okay. Quite by accident, I knocked the pentode in the output stage and the crackle disappeared. On examining the tube, a slight tug pulled off the cap. The wire coming through the tube had broken at the very top, and, as the cap expanded with the heat, the contact became highly microphonic. When resoldered the receiver worked perfectly."—Peter J. Stoner, Liverpool, England.

Electrolytic Condensers

Here's one that may help you out with an electrolytic condenser job. Writes Walter J. Robertson, of Robertson's Radio Service, Long Beach, California: "Having replaced scores of electrolytic condensers in various types of sets, we have found that the trouble has not always been due to the age of the condenser, the applied voltage or any inherent defect in the condenser itself. As every serviceman knows, in a great many sets, especially the small and compact midget radios, the electrolytic condensers are held in place by metal straps which are bolted to the chassis. It may be that when these condensers are installed that this ring or strap is just a close fit. However, it was noticed that in many cases, after a few months of service, this strap was causing a deep groove in the condenser. It seems that the dry electrolytics expand a bit after being placed in service for a while, and, as a result, there is a very heavy pressure against the condenser tube at the point of contact. This pressure has caused many a condenser to short circuit. In other cases it has been noticed that this pressure has forced the solution or thick paste to seep through to come in contact with the metal strap, resulting in an inoperative set. These problems are largely solved by not using the metal strap. Since most of the electrolytic condensers now have small lugs fastened at each end, it is very easy to solder these lugs to the chassis, and thus hold the condenser firmly in place. If a condenser does not have these lugs, a bit of melted tar, judiciously applied, will mount the condenser to the chassis equally as well. This practice has worked out beautifully in our shop, and has caused our condenser replacements to become very close to one hundred percent efficient." (*Continued on next page*)

At last! An Economical and Efficient

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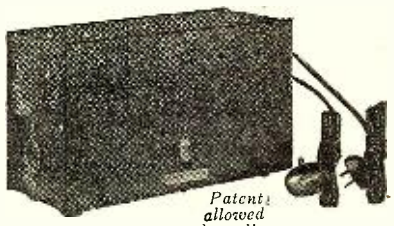

Patent allowed and pending

The NUNN INVERTER

Type XR-115. Line voltage 115 volts D.C. Output voltage 115 volts A.C. Maximum load, 150 watts, continuous. As high as 250 watts may be used intermittently. Efficiency 80%.

Makes possible for owners in D.C. districts the A.C. current necessary for best radio operation, particularly with foreign short wave reception. Simple, convenient, quiet operating. Installed easily without extra wiring, expense or difficulty. Requires no oiling, adjustment or service common to former systems. Fully warranted for one year. Only wearing part is vibratory switch, specially developed for this service, which is long-lived and trouble-free. Standard 90-day guarantee on vibrator, which ordinarily gives 2500 hours of service, and is easily replaceable by anyone, at cost of only $3.00. Big field for dealers and service men now that a truly efficient, trouble-free unit is available.

LIST PRICE--MODEL XR-115 $30

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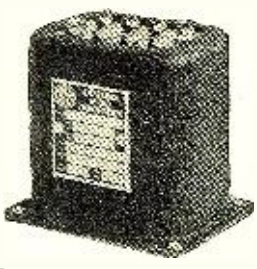

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Ask for Bulletin 1002

AMERICAN TRANSFORMER COMPANY
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THIS MONTH'S SALES TIP

We have on several occasions stressed the possibilities of a good looking business card.

Making Your Business Card Sell

Below is shown a good idea of what can be done in the way of putting a concise sales argument on the service business card. These cards are printed from attractive and readily available type fonts, and serve the multiple purpose of reminders, business cards and advertisements in miniature.

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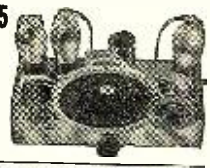

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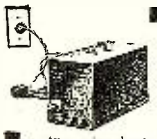

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RADIOS—World's cheapest. 22 models. No-cost sample. N-20th Century Co., K.C. Mo.

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WANTED: County Salesman with car, to demonstrate and service for large Ohio manufacturer. First-Class job. 243 Fyr-Fyter Co., Dayton, Ohio.

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manufactured by the Standard Register Company of Dayton, Ohio, which keeps track of any kind of a business transaction. Special blanks can be secured for radio

FIGURE 4

work, and the whole idea will appeal to the systematic serviceman—in the pocket size.

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The S.O.S. Corporation, New York City, has recently developed a double channel amplifier system, of the most modern type, especially for use in small motion picture houses. In anticipation of emergency, all parts are in duplicate, including switches, meters, volume controls, mixers, changeovers, jacks, exciter lamp transformers, photocell potentiometers and speaker outputs.

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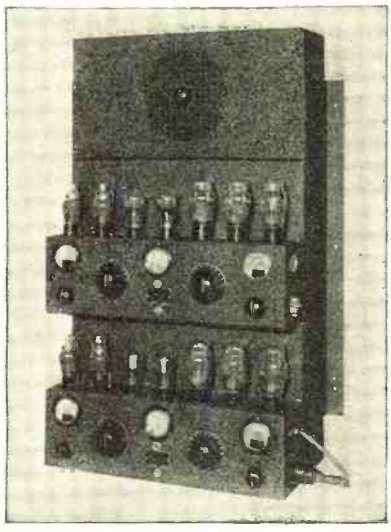

FIGURE 5

exterior power supply, and the following features are stressed: Inaudible hum level, self-contained self-excited dynamic monitor with separate volume control, tone color control to suit theater acoustics, calibrated dials for volume and exciter lamp control, and meters which indicate, at all times, the P.E.C. voltage and exciter lamp current.

These theater amplifiers will furnish current for 4 ampere, 8.5 volt and 5 to 7.5 ampere, 10 volt exciter lamps, and a photoelectric cell potential of from 50 to 120 volts. It is maintained that the changeover switches are absolutely silent and clickproof.

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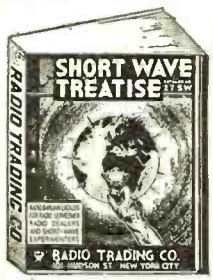

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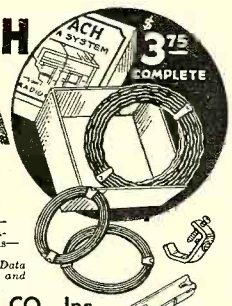

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Write Dept. RN-8 for FREE Data Sheets on Antenna Kits, Aerial and Hook-up Wire, Insulators, etc.

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Occupation.....

If you reside in Canada, send this coupon to the International Correspondence Schools Canadian, Limited, Montreal, Canada.

THE demand for tickets to broadcasts and the desire of many entertainers to have studio audiences has led to still greater provisions by the networks to accommodate large groups of on-lookers at presentations. When NBC launched its mammoth auditorium studio in Radio City in 1933 it seemed that the matter of studio audiences was pretty well taken care of with the chamber that accommodated some 1,500 visitors. And, about a year ago, CBS took over the Hudson Theatre in New York, converting it into the Columbia Radio Playhouse. In recent weeks, NBC has been utilizing the Center Theatre in Radio City for broadcasts of the General Motors Sunday program. This theatre seats 3,600 persons and is perhaps the largest "studio" in the world for a weekly presentation. And, CBS, at about the same time, took over the Avon Theatre, redesignating it as Columbia Radio Playhouse No. 2. Theatres and actor's groups have occasionally complained that free admission to the studios takes away business that properly belongs to the theatre. Although it is our opinion that some audience programs are made annoying to the listener, especially when entertainers play up to the onlookers instead of the microphone, we must differ with the theatrical argument. There's no proof that the same person using a free studio pass would be buying his way into a theatre if the broadcast audiences were abolished. More likely, we say, he'd stay home and listen to his favorite program.

THE Radio City Party program presented on NBC Saturday nights under the sponsorship of the RCA-Radiotron Company, features guest appearances of outstanding radio performers. The visiting stars are interviewed by John B. Kennedy, who serves as master of ceremonies on each program. Frank Black's orchestra supplies the musical background for the radio manufacturer's series.

Free Tube Charts

Here is an extremely useful tube chart giving the characteristics, description and application on all tubes now in use. In addition to this data the chart shows the

base connections of tubes and contains a list of the special shielded tubes for replacing the old Majestic types. The chart illustrated herewith measures 11 inches by 23 inches making a convenient size for mounting in the store or shop or laboratory and if folded twice it fits into the analyzer case or into a laboratory loose-leaf notebook. Through the courtesy of the Raytheon Production Co., we are able to offer this chart Free to our readers who write in requesting it to RADIO NEWS, Department R, 461—8th Avenue, New York City.

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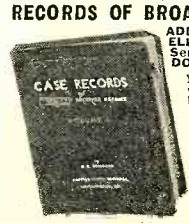

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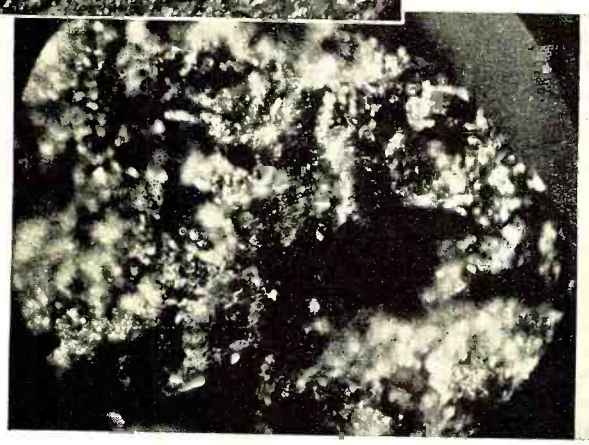
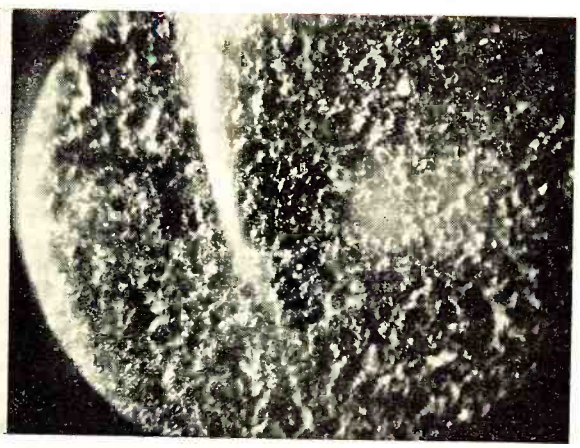
Unretouched photo of Improved Lynch Resistor, taken under 80-power microscope. Note the uniformity which gives greater current-carrying capacity—freedom from heat . . . noise . . . change!

The Improved LYNCH RESISTOR



Ordinary resistor under 80-power microscope (unretouched photo) . . . Note rough surface which causes excessive heating;—gradual change in resistance.



Another ordinary resistor under 40-power microscope (unretouched photo). Lower current-carrying capacity is due to many voids . . . in such a porous mass, contact is point contact only.

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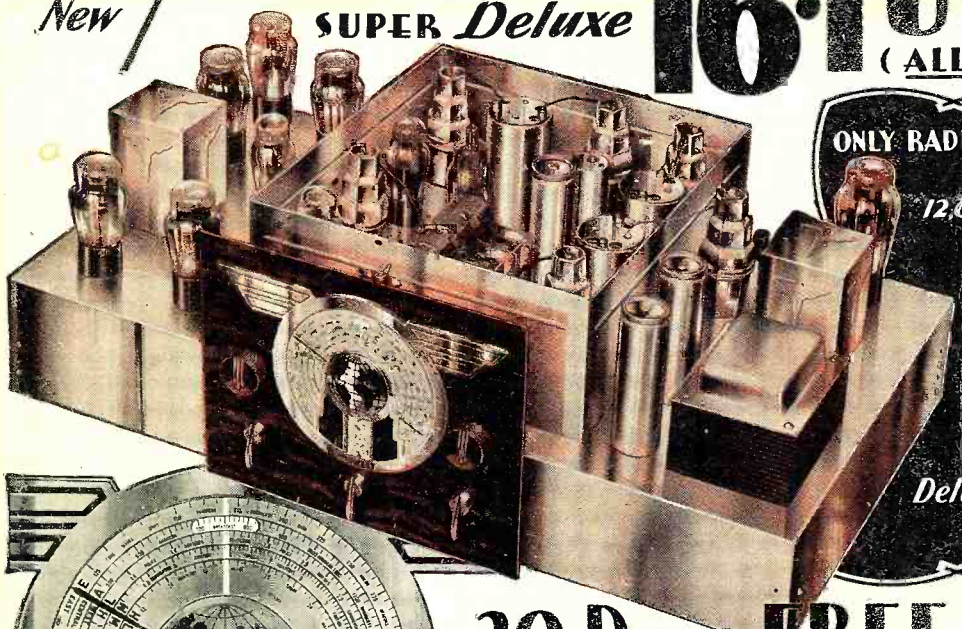

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